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THE TOP TEN CRITICAL MIS ISSUES
IN THE DEPARTMENT OF DEFENSE

by

Rafael A. Gacel
MARCH 1991

Thesis Advisor: William J. Haga

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Information systems (IS) professionals in the Department of the Navy (DON), face a multitude of IS management problems. Unfortunately, the U.S. Navy and Marine Corps do not have the financial, managerial, or technical resources to tackle every one of these problems. Therefore, it is helpful to determine which are the most critical issues facing IS officers in the Navy and Marine Corps, and how much agreement there is among IS officers in the Navy and Marine Corps regarding the importance of these critical issues. It is also helpful to determine how those critical issues identified by Navy IS officers compare with those identified by Marine Corps IS officers, and how their critical issues compare with those identified by civilian corporate IS executives.

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The Top Ten Critical MIS Issues in the Department of Defense

by

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ABSTRACT

Information systems (IS) professionals in the Department of the Navy (DON), face a multitude of IS management problems. Unfortunately, the U.S. Navy and Marine Corps do not have the financial, managerial, or technical resources to tackle every one of these problems. Therefore, it is helpful to determine which are the most critical issues facing IS officers in the Navy and Marine Corps, and how much agreement there is among IS officers in the Navy and Marine Corps regarding the importance of these critical issues. It is also helpful to determine how those critical issues identified by Navy IS officers compare with those identified by Marine Corps IS officers, and how their critical issues compare with those identified by civilian corporate IS executives.

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I. INTRODUCTION

A. THE PURPOSE OF THIS STUDY

Information systems (IS) managers and their organizations face difficult decisions on which critical IS issues to focus their research, managerial, and educational resources on. Researchers must choose which issues to study. Managers must choose projects to which they will commit limited resources. Universities must choose the direction of their educational programs. Professional associations must arrange conferences to deal with contemporary IS issues. For these reasons, it is important to identify which issues IS professionals feel are the most critical [Ref. 1].

Information systems professionals in the Department of the Navy (DON) face similar IS management problems. The U.S. Naval Services, consisting of the U.S. Navy and the U.S. Marine Corps, do not have the financial, managerial, or technical resources to tackle all their problems. Different IS managers in the U.S. Navy and the U.S. Marine Corps have different opinions as to what their critical IS issues are. Therefore, it is essential to identify the major IS issues facing the Naval Services so that the DON can focus its limited resources on solving the critical issues first.

The primary purposes of this research are to determine:

1. The top ten critical issues facing information systems officers and managers in the U.S. Marine Corps, U.S. Navy, and Department of the Navy.

2. The order of importance of these critical issues the U.S. Marine Corps, U.S. Navy, and DON.

3. The extent of agreement among IS officers and managers in the U.S. Marine Corps, U.S. Navy, and DON regarding the importance of these critical issues.

4. How critical issues identified by Marine Corps IS officers and managers compare with those identified by Navy IS officers and managers.

5. How critical issues identified by DON information systems officers and managers compare with those identified by civilian corporate IS managers.

B. THE BENEFITS OF THIS STUDY

The results of this study will benefit the Department of the Navy in at least five ways:

1. The study will reveal the major problems that information systems officers in the U.S. Naval Services are facing after they graduate from the Master of Science in Computer Systems Management program at the Naval Postgraduate School and start working in an IS management environment.

2. The study can provide possible thesis topics upon which future IS managers studying at the Naval Postgraduate School can focus their research.

3. The study can guide the research of IS faculty at the Naval Postgraduate School, Department of Defense (DOD) Computer Institute, and other DOD information systems institutions.

4. The study can guide the formulation of IS standards by functional area work groups under the

Corporate Information Management (CIM) initiatives headed by the DOD Deputy Comptroller for Information Resources Management.

5. The study can examine the validity of the U.S. Marine Corps' Mid-Range Information Systems Plan (MRISP) survey of IS problem areas.

II. LITERATURE REVIEW

A. INTRODUCTION

There are five studies of Management Information Systems (MIS) critical issues similar to this one that are detailed in Management Information Systems Quarterly and other IS publications. These studies were conducted and published between 1980 and 1990.

B. BALL AND HARRIS STUDY OF 1982

Ball and Harris [Ref. 2] determined the MIS issues deemed most important by members of the Society for Management Information Systems (SMIS). In 1980, they mailed questionnaires to 1400 members asking them to use a six-point Likert-type scale to rank the importance of 18 MIS issues and needs as well as the role that SMIS should play in satisfying those needs. On the first part, a score of "one" was used to indicate that the issue was "Not Important," while a score of "six" was used to indicate that the issue was "Very Important." Similarly, on the second part, a score of "one" was used to indicate that the role that SMIS should play is "Not An Important Role," while a score of "six" was used to indicate that the role that SMIS should play is a "Very Important Role." Ball and Harris tallied the scores of the 417 members who responded to the questionnaire and calculated

a mean score and a standard deviation for the importance of each issue to the respondents as well as a mean score and a standard deviation for the role that SMIS should play in satisfying each need. The highest means indicated the most interest in those issues and needs, while small standard deviations indicated that the responses were clustered around those means. Table 2.1 lists these 18 critical issues along with their ranks, mean scores, and standard deviations. The response rate of 29.8% was relatively high considering that the questionnaire required 20 to 30 minutes to complete and that most respondents were executives in middle and upper management.

C. DICKSON, LEITHESIER, NECHIS, AND WETHERBE STUDY OF 1984

Dickson, et al, [Ref. 3] used a four-round Delphi inquiry to answer three questions:

1. What are the ten most important IS management issues as seen by leading IS professionals?
2. What is the order of importance of these issues?
3. How much agreement do these IS professionals have about these issues?

According to Millar [Ref. 4], Delphi is a group process which uses written media to solicit and aggregate the judgments of several individuals in order to improve the quality of a group's work. In essence, Delphi is a series of linked questionnaires. Beginning with an open-ended

TABLE 2.1
BALL AND HARRIS CRITICAL ISSUES

RANK	MEAN SCORE	STD DEV.	CRITICAL ISSUES
1	5.13	1.08	MIS Long Range Planning and Integration
2	5.01	1.09	Gauging MIS Effectiveness
3	4.67	1.11	Impact of Communications on MIS
4	4.59	1.28	The Developing Role of the Information Resource Manager
5	4.43	1.31	Decision Support Systems
6	4.39	1.35	Office of the Future Management
7	4.35	1.31	Employee Training and Career Path Development
8	4.35	1.39	Education of Non-MIS Management
9	4.29	1.34	Centralization vs Decentralization of MIS Functions
10	4.29	1.35	Employee Job Satisfaction
11	4.08	1.42	Providing End Users with Their Own Development Systems
12	3.95	1.32	Problems of Maintaining Data Security
13	3.87	1.38	Impact of Software Engineering on MIS
14	3.80	1.36	Problems of Maintaining Information Privacy
15	3.77	1.37	Management Science and the MIS Environment
16	3.72	1.56	Professional Recruitment
17	3.57	1.49	MIS Ethics
18	3.10	1.49	Impact of Personal Computes on an Institutional Environment

questionnaire, subsequent questionnaires feed back group responses to the preceding questionnaires and ask for further information. The process stops when consensus among the individuals is reached or when sufficient information has been exchanged. Thus, the Delphi process draws on the experience of experts, documents facts as well as personal preferences

and expectations, and avoids the problems of face-to-face interaction.

Between 1982 and 1983, Dickson and other researchers conducted a postal survey of information systems academics and practitioners asking them to use a ten-point scale to rank what they considered to be the top ten MIS issues in the 1980's from a list of 19 MIS issues. Each of the respondents scored only his top ten issues with a score of from ten to one points. A score of ten was assigned to their highest priority issue, while a score of one was assigned to their tenth highest priority issue, and so on. A score of zero was assigned to the nine issues that they did not rank. The researchers tallied the scores of the 54 participants who responded to the fourth and final round, and then calculated a mean, standard deviation, median, interquartile range, and a top ten percentage for each issue. Of these 54 respondents, four were prominent information systems academics and most of the others were directors, vice-presidents, or consultants. Table 2.2 lists these 19 critical issues along with their ranks, mean scores, and standard deviations.

The standard deviations of the rank scores is directly related to the average of the differences between the individual participants' scores and the group average scores. A small standard deviation indicates a small difference between the individual scores and the mean scores and suggests higher agreement among the individuals. On the other hand, a

TABLE 2.2
DICKSON, ET AL., CRITICAL ISSUES

RANK	MEAN SCORE	STD DEV.	CRITICAL ISSUES
1	9.1	1.5	Improved IS planning
2	7.4	2.1	Facilitation and management of end user computing
3	6.4	2.4	Integration of data processing, office automation, and telecommunications
4	6.0	2.6	Improved software development and quality
5	5.3	3.0	Measuring and improving IS effectiveness/productivity
6	4.7	2.6	Facilitation of organizational learning and usage of IS technologies
7	3.7	2.8	Aligning the IS organization with that of the enterprise
8	2.3	2.0	Specification, recruitment, and development of IS human resources
9	2.2	2.3	Effective use of the organization's data resource
10	1.5	2.1	Development and implementation of decision support systems
11	1.5	2.6	Planning and management of the applications portfolio
12	1.3	2.4	Planning, implementation, and management of office automation
13	0.9	2.2	Planning and Implementing a telecommunication system
14	0.7	1.8	Information security and control
15	0.7	1.8	Increasing understanding of the role/contribution of IS
16	0.3	1.3	Determination of appropriate IS funding
17	0.2	1.2	Effective usage of graphics
18	0.0	0.5	Impact of artificial intelligence
19	0.0	0.1	Management of data and document storage

large standard deviation indicates a large difference between the individual scores and the mean scores and suggests lower

agreement among the individuals. The Interquartile range is a similar measure of consensus. Thus, a standard deviation of zero and an interquartile range of zero indicate perfect consensus. Therefore, the lower the two measures of dispersion, standard deviation and interquartile range, the higher the consensus.

D. HARTOG AND HERBERT STUDY OF 1986

Hartog and Herbert [Refs. 5 & 6] surveyed 1,500 managers from 107 companies in the St. Louis, Missouri, area to determine which issues facing management were the most important and the most difficult to solve. In 1985, they mailed questionnaires to these managers asking them to use a four-point scale to rate 21 MIS issues. Each response to the question "How important is it to your organization to address the issue (solve the problem or make improvements) during the next two years?" was scored by assigning one point for "not important" through four points for "very important." They calculated an average score for each company, based on all the questionnaires returned from that company, for each issue. Then, they calculated an average score across companies for each issue. Thus, they equally weighted each company's responses in determining an average score for each issue. At least one questionnaire was returned from 63 of the 107 companies surveyed, indicating a 58.9% company response rate. A total of 600 questionnaires were returned, indicating a 40%

individual response rate. Table 2.3 lists these 21 critical issues along with their ranks and mean scores.

TABLE 2.3
HARTOG AND HERBERT CRITICAL ISSUES

RANK	MEAN SCORE	CRITICAL ISSUES
1	3.4	Planning
2	3.3	Aligning MIS with the Business Goals
3	3.3	Software development
4	3.3	Data Utilization
5	3.1	End-User Computing
6	3.1	Data Security
7	3.1	Integration of Technologies
8	3.0	Educating Senior Personnel
9	2.9	Quality Assurance
10	2.8	Telecommunications Technology
11	2.8	Office automation
12	2.8	Information Centers
13	2.7	Telecommunications Deregulation
14	2.7	Measuring Productivity
15	2.7	Recruiting and Training
16	2.6	Fourth Generation Languages
17	2.6	Centralization
18	2.3	External Data
19	2.2	Decision Support Systems
20	2.1	Computer Integrated Manufacturing
21	1.9	Expert Systems and Artificial Intelligence

E. BRANCHEAU AND WETHERBE STUDY OF 1987

Brancheau and Wetherbe [Ref. 7] used a three-round, five-part Delphi inquiry combined with a historical analysis of previous research to answer five questions:

1. What are the ten most critical issues facing IS executives over the next three to five years?

2. What is the order of importance of these issues?

3. How much agreement is there among IS executives about the importance of these issues?

4. How closely do corporate general managers outside of IS agree with IS executives on the key issues and their importance?

5. How have the most critical issues in IS changed over time?

In 1986, they conducted a postal survey of corporate general managers and information systems executives asking them to use a ten-point scale to rank what they considered were the top ten MIS issues facing IS executives in the next three to five years from three lists of 20, 26, and 20 MIS issues. The response rates were 50% for the first round, 62% for the second round, and 76% for the third round. Each respondent ranked only his top ten issues from one to ten. A rank of one was assigned to their highest priority issue, while a rank of ten was assigned to their tenth highest priority issue. and so on. The authors assigned scores of from ten points to the issue ranked number one to one point for the issue ranked number ten. They assigned a score of zero to the ten to sixteen issues that were not ranked. The authors tallied the scores of the 12 corporate managers and 68 IS executives who responded to the third and final round, and then calculated a mean, standard deviation, and a top ten percentage for each issue. They discovered that general managers and IS executives reached consensus about the top ten

information systems issues, but that the two groups disagreed about the overall order of importance across those issues.

Furthermore, compared to the 1982-1983 study, three new issues, "Using Information Systems for Competitive Advantage," "Increasing Understanding of Role and Contribution of IS," and "Developing an Information Architecture" joined the top ten critical issues, while several other top ten issues experienced shifts in their rank order. "Improving the Effectiveness of Software Development" dropped from number four to number 13, "Specifying, Recruiting, and Developing Human Resources" dropped from number eight to number 12, and "Development and implementation of decision support systems" dropped completely from the top twenty critical issues list from number ten. Table 2.4 lists the 20 critical issues identified by IS executives along with their ranks, mean scores, and standard deviations.

F. MOYNIHAN STUDY OF 1990

Moynihan [Ref. 8] surveyed 15 chief executive officers (CEOs), 14 senior functional managers (SFMs), and 20 information technology managers (ITMs) from organizations in Ireland to answer three questions:

1. Do CEOs, SFMs, and ITMs experience the same issues?
2. If CEOs, SFMs, and ITMs do experience the same issues, in what ways do they view these issues differently?

TABLE 2.4
BRANCHEAU AND WETHERBE CRITICAL ISSUES

RANK	MEAN SCORE	STD DEV.	CRITICAL ISSUES
1	8.6	2.60	Improving IS Strategic Planning
2	7.4	2.49	Using Information Systems for Competitive Advantage
3	7.0	2.18	Facilitating Organizational Learning and the Use of IS
4	6.6	2.95	Increasing Understanding of Role and Contribution of IS
5	4.9	2.87	Aligning the IS Organization with that of the enterprise
6	3.8	2.50	Facilitating and Managing End-User Computing
7	3.6	2.64	Promoting Effective Use of the Data Resource
8	2.9	2.69	Developing an Information Architecture
9	2.6	2.83	Measuring IS Effectiveness and Productivity
10	2.2	2.19	Integrating Data Processing, Office Automation, Factory Automation, and Telecommunication
11	1.4	1.84	Planning, Implementing, and Managing Telecommunications
12	1.2	2.22	Specifying, Recruiting, and Developing Human Resources
13	0.8	1.86	Improving the Effectiveness of Software Development
14	0.5	1.61	Enabling Electronic Data and Multi-Vendor Integration
15	0.4	1.29	Managing the Impact of Artificial Intelligence
16	0.3	1.20	Planning and Management of the Applications Portfolio
17	0.2	1.00	Planning, Implementing, and Managing Factory Automation
18	0.2	0.88	Improving Information Security and Control
19	0.1	0.70	Selecting and Integrating Packaged Applications Software
20	0.1	0.52	Determining Appropriate IS Funding Levels

3. Do senior managers in Ireland experience the same issues as their counterparts in the United States?

Moynihan conducted open-ended interviews with a representative from each of 49 financial services, manufacturing, retail, distribution, transportation, health care, and government organizations ranging in size from 20 to 14,000 employees. The responses were recorded and then subjected to a content analysis to determine the primary "wants" of each executive. Each want was rated either plus or minus depending on whether the executive viewed his or her organizations performance as satisfactory or not satisfactory with respect to that want, and an overall "satisfaction index" was calculated to give a composite measure for each want. Moynihan identified 11 wants that were mentioned frequently by the representatives of at least 25% of the organizations, and six wants that were mentioned almost exclusively by the IT managers. The essential difference between this methodology and those of the four earlier studies is the use of semi-structured interviews instead of postal questionnaires and checklists. Table 2.5 lists these 11 critical issues along with their ranks and the number of managers who mentioned them.

TABLE 2.5
MOYNIHAN CRITICAL ISSUES

RANK	NO.	CRITICAL ISSUE
1	34	Level of data-sharing across systems and departments
2	34	Quality of planning for information technology and the link with business planning
3	22*	Appropriateness of corporate policy for information technology in divisions
4	30	Appropriateness of the style of "case making" needed to get approval for major proposals on information technology
5	30	Quality of users' commitment and contribution to systems development projects
6	29	Degree to which key processes are supported by state-of-the-art systems
7	27	Extent to which information technology is being used to gain competitive advantage
8	23	Quality of in-house technical skills in information technology
9	22	Level of use of current office automation and communications technology
10	20	Speed of implementation of new systems and the responsiveness of the information systems department
11	19	Extent to which information technology is visibly improving organizational efficiency

*22 of 29 respondents

III. METHODOLOGY

A. THE SCOPE AND METHODOLOGY OF THIS STUDY

This study was conducted during a six month period in 1990. Surveys were sent to every Navy and Marine Corps officer who graduated with a Master of Science in Information/Computer Systems from the Naval Postgraduate School (NPS) between 1982 and 1989 and who was still on active duty in 1990. Approximately 360 of the 414 Naval Services graduates during this eight year period were still on active service in 1990. More than half of them have served as information systems managers for at least two years. By analyzing their responses to the questionnaires, all five of the primary research questions were answered. The Brancheau and Wetherbe (1987) study which used a Delphi inquiry served as a model for this study. However there were four major differences between this study and theirs:

1. Only active duty Navy and Marine Corps IS officers were surveyed. Military officers are the military counterparts of middle level executives at civilian corporations.

2. Only two rounds of questionnaires were mailed to DON IS officers instead of three rounds, because of the limited time frame of this study.

3. General managers were not surveyed, and, thus, no distinction was made between the critical issues of IS managers and general managers.

4. The questionnaires were tailored to the unique environment and terminology of the Naval Services. Unlike the Wetherbe and Ball Study which asked IS managers and general managers to rank what they felt would be the top ten critical issues facing them over the next three years to five, this study asked IS officers to rank what they felt are the top ten critical issues facing them now. In the changing world of IS everyone has a short time perspective, and it is difficult to accurately forecast conditions even a few years in the future.

B. A TEN STEP PROCESS

This study required a ten step process:

1. Obtaining the names, U.S. Social Security numbers (SSNs), ranks, and other vital data of NPS information systems graduates
2. Obtaining the mailing addresses of these graduates
3. Implementing a survey monitoring system
4. Preparing the Round One survey
5. Mailing the Round One survey
6. Analyzing the Round One survey
7. Preparing the Round Two survey
8. Mailing the Round Two survey
9. Analyzing the Round Two survey
10. Comparing the rankings of the Round Two survey with those of the Brancheau and Wetherbe (1987) study.

1. Obtaining the Names: The names of Navy and Marine Corps graduates were obtained from the registrar's office of the Naval Postgraduate School. Data on officers who graduated

after June 30, 1986, were obtained by querying the student database. However, data on officers who graduated before July 1, 1986, were obtained by manually searching through old graduation lists in a filing cabinet. Table 3.1, provides statistics on the number of NPS information systems graduates from 1982 to 1989. Naval and Marine Corps officers comprised more than 82 percent of these graduates.

TABLE 3.1
1982-1989 NAVAL POSTGRADUATE SCHOOL IS GRADUATES

YEAR	USN	USMC	TOTAL DON	OTHER	TOTAL
1982	43	12	55	8	63
1983	25	6	31	1	32
1984	38	6	44	19	63
1985	48	9	57	25	82
1986	46	7	53	13	66
1987	53	17	70	14	84
1988	37	11	48	2	50
1989	47	8	55	6	61
TOTAL	337	77	414	88	502

2. Obtaining the Military Addresses: The command mailing addresses of the Navy officers were obtained from the personnel support detachment at the Naval Postgraduate School and from the Naval Military Personnel Command in Washington D.C. These addresses were obtained by first looking up the

Unit Identification Code (UIC) for each officer on the Bidex microfiche file (which is ordered alphabetically and contains pertinent data on every active duty Naval Officer); then looking up the command name for each UIC in the OPNAV PO9B2-107(89): Standard Navy Distribution List, Part 1, Edition 124, or the OPNAV PO9B2-105(87): Standard Navy Distribution List and Catalog of Naval Shore Activities, Part 2, Edition 72; and finally looking up the command mailing address for each command name in the NAVSO P-1000-25: Volume 2, Chapter 5, Navy Comptroller Manual, Revision 59 and/or the 1989 National Five Digit Zipcode and Post Office Directory. After following this procedure, the command addresses for 252 of the 294 Naval officers still on active duty on December 31, 1989, were obtained. The remaining 42 addresses were obtained after submitting a written request to the Naval Military Personnel Command in Washington, D.C., and waiting six weeks for their response.

The command mailing addresses for the Marine Corps officers were obtained from the Marine Support Detachment at the Presidio of Monterey in Monterey, California. These addresses were obtained by first looking up the Reporting Unit Code (RUC) and the Monitor Command Code (MCC) for each officer in the Alpha Locator microfiche file (which is ordered alphabetically and contains pertinent data on every active duty Marine officer) and the Master Locator microfiche file (which is ordered by U.S. social security number and contains

pertinent data on every active duty Marine Officer); and then obtaining the command name and mailing address from the MCO P1080.20K: Joint Uniform Military Pay System/Manpower Management System Codes Manual and the 1989 National Five Digit Zipcode and Post Office Directory. After following this procedure, the command addresses for all 65 Marine Corps officers still on active duty on December 31, 1989, were obtained.

3. Implementing a Survey Monitoring System: In order to manage this project, analyze survey data, and perform analysis, a survey monitoring system was implemented using dBASE IV. The system contains 45 files, requires 512Kb RAM, approximately 760Kb bytes of memory storage space, and runs on a typical IBM clone personal computer.

4. Preparing the Round One Survey: The Round One survey was designed by using Brancheau and Wetherbe's (1987) Round One survey and tailoring it to the Information Systems community of the Naval Services. The Round One questionnaire is shown in Appendix A. 500 copies of the Round One survey were printed on light green bond paper. Light green was used because it is a "warm" pastel which stands out among ordinary white paperwork.

In the Round One questionnaire, officers were asked to rank what they considered were their top ten IS issues from a listing of 20 critical IS issues and rationales. Moreover, they were given the opportunity to identify and rank

additional issues and include their rationales, change the wording of the 20 issues and their rationales, and add their personal comments.

5. Mailing the Round One Surveys: On April 13, 1990, surveys were sent to 254 Naval officers and 42 Marine officers. On May 25, 1990, six weeks later, surveys were sent to the remaining 42 Naval officers and 18 Marine officers. Of the total 359 surveys that were mailed, 23 were returned by the postal service because those officers had either been transferred to another duty station or discharged from active duty. Thus, 336 officers of the 294 Naval officers and 65 Marine Officers who were sent Round One questionnaires, actually received them. Round One response rates and other important statistics are shown in Table 3.2.

In addition to using a warm color, several other measures were taken to increase the response rate:

1. The officer's rank and name was handwritten on each survey
2. The author's signature was signed on each survey
3. The officer's rank, name, and address was handwritten on each envelope
4. A pre-addressed postage paid envelope was included with each survey
5. The author's mailing address was handwritten on each pre-addressed envelope
6. The officer was offered a copy of the final results of the study.

TABLE 3.2
ROUND ONE STATISTICS AND RESPONSE RATES

	USMC	USN	DON
Surveys mailed to NPS graduates	64	295	359
Undeliverable surveys returned by the postal service	3	20	23
Surveys actually received by graduates	61	275	336
Surveys returned by NPS graduates	46	170	216
Erroneous surveys returned by graduates	0	6	6
Blank surveys returned by graduates without MIS experience	2	12	14
Valid surveys returned by NPS graduates	44	152	196
Valid surveys from graduates without MIS experience	4	35	39
Valid surveys from graduates with MIS experience	40	117	157
Percentage of surveys returned by NPS graduates	75	62	64
Percentage of valid surveys from graduates	72	55	58
Percentage of valid surveys from graduates with MIS experience	66	43	47

A cut-off date of July 13, 1990, 13 weeks after the first mailing and six weeks after the second mailing, was established for collating and analyzing the data necessary to prepare the Round Two questionnaire, which is shown in Appendix C. Nevertheless, four valid surveys that arrived right the cut-off date, were also included in the study.

6. Analyzing the Round One Survey: A total of 212 Round One surveys were returned by the cut-off date. Six graduates erroneously completed and returned the questionnaire while 53

graduates without MIS experience completed and/or returned the survey; 114 Naval officers and 39 Marine officers with MIS experience correctly completed and returned the Round One survey. One Naval officer and one Marine officer with experience who correctly completed the survey and returned it after the cut-off date, but before the Round Two survey was mailed, had their rankings included in the study. In addition, two graduates who returned valid surveys several weeks after the cut-off date had their rankings included in the study. Overall a total of 216 officers returned the Round One surveys; 117 of these respondents were Naval officers and 40 were Marine Corps officers with MIS experience.

Many officers identified and ranked additional critical issues; 77 officers with MIS experience as well as nine officers without identified additional critical issues and included their rationales. Many others changed some of the wording of the 20 original critical issues, changed some of the wording of the rationales, and added their personal comments. Furthermore, 105 officers with MIS experience and 19 without requested copies of the completed study.

The 157 valid surveys from the officers with MIS experience were analyzed using the survey monitoring system. Scores ranging from one point for a number ten ranking to ten points for a number one ranking were assigned to the critical issues. A score of zero was assigned to any issues which were not ranked. Then, total scores and mean scores for each issue

were calculated to determine their combined ranking and their individual sea service ranking. To avoid a proliferation of additional new issues that were identified, only those having a total point score of 20 (the equivalent of two officers ranking the issue number one) were incorporated into the Round Two survey. Six additional issues met this criteria. Thus, a total of 26 critical issues were analyzed and incorporated into the Round Two questionnaire.

7. Preparing the Round Two Survey: The Round Two survey was also designed by using the Brancheau and Wetherbe (1987) Round Two Survey and tailoring it to the Information Systems community of the Naval Services. The Round Two questionnaire is shown in Appendix C. Only rankings for officers with MIS experience were incorporated into this survey. 200 copies of the Round Two survey were printed on yellow bond paper. Yellow was used because, like green, it is also warm pastel and to distinguish it from the Round One survey.

In the Round Two questionnaire, officers were again asked to rank what they considered were their top ten most critical issues from a listing of 26 critical issues and rationales.

8. Mailing the Round Two Survey: On July 27, 1990, surveys were sent to the 115 Naval officers and 40 Marine officers with experience who responded to the first survey. Furthermore, on September 26, 1990, seven weeks later, surveys were sent to two Naval officers who returned the Round One survey several weeks late. By this date, 102 Round Two

Questionnaires had been returned. Of the total 157 surveys that were mailed, six were returned by the postal service because those officers had either been transferred to another duty station or discharged from active duty. Thus, 151 officers actually received the Round Two questionnaire. The same measures that were used to increase the response rate for the first survey were also used to increase the response rate of the second survey. A cut-off date of October 26, 1990, seven weeks after the mailing of the surveys, was established for collating and analyzing the data necessary to complete the study. Round Two response rates and other important statistics are shown in Table 3.3.

9. Analyzing the Round Two Survey: A total of 103 Round Two surveys were returned before the cut-off date. Three graduates erroneously completed the questionnaire, while 75 Naval officers and 25 Marine officers correctly completed the Round Two survey. Ten more officers requested a copy of the completed study.

The 100 valid surveys were analyz using the survey monitoring system. Scores ranging from one point for a number ten ranking to ten points for a number one ranking were assigned to the critical issues. A score of zero was assigned to any issue that was not ranked. Then total scores and mean scores for each issue were calculated to determine their combined ranking and their individual sea service ranking.

TABLE 3.3
ROUND TWO STATISTICS AND RESPONSE RATES

	USMC	USN	DON
Surveys mailed to NPS graduates	40	117	157
Undeliverable surveys returned by the postal service	3	3	6
Surveys actually received by graduates	37	114	151
Surveys returned by NPS graduates	25	78	103
Erroneous surveys returned by graduates	0	3	3
Valid surveys returned by NPS graduates	25	75	100
Percentage of surveys returned by NPS graduates	68	68	68
Percentage of valid surveys from graduates	68	66	66

10. Comparing the Final Results with the Brancheau and Wetherbe (1987) Study: The Round Two survey results were compared with those of the Brancheau and Wetherbe (1987) study. The process of comparing these two surveys is described in detail in Chapter Six.

IV. ROUND ONE FINDINGS

A. INTRODUCTION

Overall, 157 valid Round One surveys were returned by NPS graduates with MIS experience and were mailed the Round Two questionnaire; 77 (49.0%) of these officers identified and ranked additional critical issues and included their rationales. The rankings, mean scores, and standard deviations of the top ten critical issues are shown in Tables 4.1 to 4.4 while the rankings, mean scores, and standard deviations of all 26 critical issues are shown in Tables B.1.1 to B.4.2 of Appendix B. These rankings differ slightly from the rankings presented in the final questionnaire because the tables include the four surveys which arrived after the cut-off date. The rationales for these 26 issues are shown in Appendix E.

The response rate from Marine officers was considerably higher than the response rate from Navy officers (Table 3.2). This is probably because many of the Naval officers who did not respond had no MIS experience. The fact that many Naval officers do not get assigned to IS billets after graduating from the Naval Postgraduate School is verified by the large number of surveys received from Naval officers without any MIS experience.

B. ROUND ONE RANKINGS

The DON top ten critical issues are shown in Tables 4.1 and 4.2. "Improving IS strategic planning" was the number one critical issue. Each of the DON top ten issues was ranked in the top ten by at least 49.7% of all DON officers.

There were several significant differences between the top ten critical issues facing Naval officers (Tables 4.1, 4.3, B.1.1, and B.3.1) and those facing Marine Corps officers (Tables 4.1, 4.4, B.1.1, and B.4.1). With the exception of "Determining IS funding levels" which was ranked eighth by the Navy and tied for seventh by the Marine Corps, there were differences in the rankings of the top ten critical issues facing the two services. The Navy ranked "Planning and implementing a telecommunication system" number seven and "Promoting the learning and use of IS technologies" number ten, while the Marine Corps ranked these same two issues number 13 (tied) and number 12, respectively. On the other hand, the Marine Corps ranked "Improving the quality of software development" number two and "Measuring IS effectiveness and productivity" number nine, while the Navy ranked these same two issues number 11 and number 14, respectively. Nevertheless, both services included the same eight issues in their top ten critical issues rankings. Nine of the Navy's top ten critical issues were in the combined DON top ten critical issue list. Three of these issues had the same DON and USN Ranks. Nine of the Marine Corps' top ten

critical issues were also in the combined DON top ten critical issue list. However, none of these issues had the same DON and USMC Ranks. Each of the Navy's top ten issues was ranked in the top ten by at least 47.9% of all Navy officers. Each of the Marine Corps' top ten issues was ranked in the top ten by at least 52.5% of all Marine Corps officers.

TABLE 4.1
ROUND ONE TOP TEN CRITICAL ISSUES

DON RANK	USN RANK	USMC RANK	CRITICAL ISSUES
1	3	1	Improving IS strategic planning
2	1	10	Improving information security and control
3	2	5	Integrating data processing, office automation, and telecommunication
4	4	3	Facilitating and managing end user computing
5	5	6	Increasing understanding of the role and contribution of IS
6	6	7t	Making effective use of data as an organizational resource
7	8	7t	Determining IS funding levels
8	9	4	Aligning an IS activity with the objectives of the entire command
9	11	2	Improving the quality of software development
10	7	13t	Planning and implementing a telecommunication system

t: Tied with another issue
*: New issue

TABLE 4.2
ROUND ONE COMBINED DON TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
4.24	3.72	106	67.5	Improving IS strategic planning
3.80	3.66	103	65.6	Improving information security and control
3.76	3.34	107	68.2	Integrating data processing, office automation, and telecommunication
3.68	3.37	112	71.3	Facilitating and managing end user computing
3.43	3.87	89	56.7	Increasing understanding of the role and contribution of IS
3.29	3.31	96	61.1	Making effective use of data as an organizational resource
3.13	3.67	80	51.0	Determining IS funding levels
3.08	3.57	79	50.3	Aligning an IS activity with the objectives of the entire command
3.04	3.57	83	52.9	Improving the quality of software development
2.87	3.41	78	49.7	Planning and implementing a telecommunication system

TABLE 4.3
ROUND ONE U.S. NAVY TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & in TOP	PCT. TEN	CRITICAL ISSUES
4.09	3.72	79	67.5	Improving information security and control
3.85	3.44	80	68.4	Integrating data processing, office automation, and telecommunication
3.83	3.70	73	62.4	Improving IS strategic planning
3.56	3.29	83	70.9	Facilitating and managing end user computing
3.44	3.89	68	58.1	Increasing understanding of the role and contribution of IS
3.27	3.30	71	60.7	Making effective use of data as an organizational resource
3.21	3.51	63	53.8	Planning and implementing a telecommunication system
3.06	3.71	59	50.4	Determining IS funding levels
2.74	3.37	56	47.9	Aligning an IS activity with the objectives of the entire command
2.70	3.11	62	53.0	Promoting the learning and use of IS technologies

TABLE 4.4
ROUND ONE U.S. MARINE CORPS TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
5.43	3.53	33	82.5	Improving IS strategic planning
4.25	3.75	28	70.0	Improving the quality of software development
4.03	3.57	29	72.5	Facilitating and managing end user computing
3.95	3.97	23	57.5	Aligning an IS activity with the objectives of the entire command
3.53	3.12	27	67.5	Integrating data processing, office automation, and telecommunication
3.40	3.81	21	52.5	Increasing understanding of the role and contribution of IS
3.33	3.36	25	62.5	Making effective use of data as an organizational resource
3.33	3.55	21	52.5	Determining IS funding levels
3.08	3.27	25	62.5	Measuring IS effectiveness and productivity
2.95	3.17	24	60.0	Improving information security and control

V. ROUND TWO FINDINGS

A. INTRODUCTION

Overall, 100 valid Round Two surveys were returned by NPS graduates before the cut-off date. The rankings, mean scores, and standard deviations of the top ten critical issues are shown in Tables 5.1 to 5.4 while the rankings, mean scores, and standard deviations of all 26 critical issues are shown in Tables D.1.1 to D.4.2 of Appendix D. The rationales for these 26 issues are shown in Appendix E. The response rate from Marine officers was almost identical to the response rate from Navy officers (Table 3.3).

B. ROUND TWO RANKINGS

The DON top ten critical issues are shown in Tables 5.1 and 5.2. "Improving IS strategic planning" was the number one critical issue, by far. 85.0% of DON officers ranked this issue among the top ten. Each of the DON top ten issues was ranked in the top ten by at least 46.0% of all DON officers.

There were several significant differences between the top ten critical issues facing Naval officers (Tables 5.1, 5.3, D.1.1, and D.3.1) and those facing Marine Corps officers (Tables 5.1, 5.4, D.1.1, and D.4.1). With the exception of "Improving IS strategic planning" which was ranked number one by both services, there were differences in the rankings of

the top ten critical issues facing the two services. The Navy ranked "Establishing a streamlined, more efficient procurement process" number nine and "Determining IS funding level" number ten, while the Marine Corps ranked these same two issues number 13 (tied) and number 12, respectively. On the other hand, the Marine Corps ranked a new issue, "Establishing standardized hardware, software and systems, number eight and "Measuring IS effectiveness and productivity" number ten, while the Navy ranked these same two issues number 15 and number 11, respectively. Nevertheless, both services included the same eight issues in their top ten critical issues rankings.

All ten of the Navy's top ten critical issues were in the combined DON top ten critical issue list. Seven of these issues had the same DON and USN Ranks. On the other hand, eight of the Marine Corps' top ten critical issues were in the combined DON top ten critical issue list. However, only two of these issues had the same DON and USMC Ranks. Each of the Navy's top ten issues was ranked in the top ten by at least 42.7% of all Navy officers. Each of the Marine Corps' top ten issues was ranked in the top ten by at least 48.0% of all Marine Corps officers.

C. COMPARISON OF ROUND ONE AND ROUND TWO RANKINGS

There were several significant differences between the top ten critical issues of the Round One survey (Tables 4.1, 4.2,

F.1.1, to F.3.2) and those from the Round Two survey (Tables 5.1, 5.2, F.1.1, to F.3.2). With the exception of "Improving IS strategic planning" which was ranked number one in both rounds, there were differences in the rankings of the top ten critical issues between Round One and Round Two. "Planning and implementing a telecommunication system" dropped out of the top ten from number ten in the first round to number 16 in the second round. A new issue, "Establishing a streamlined, more efficient procurement process" entered the top ten by rising from number 19 in the first round to number nine in the second round. Nevertheless, the other nine issues were in the top ten critical issues in both rounds.

Despite the differences in the rankings of the two rounds, the level of consensus did grow from the first round to the second round (Table 6.2). For Round One, the average standard deviations of the top ten issues and the 26 issues was 3.55 and 2.72, respectively. For Round Two, the average standard deviations of the top ten issues and the 26 issues was 3.40 and 2.50, respectively. Since the standard deviations of the rank scores is directly related to the average of the differences between the individual scores of the respondents and the average scores of the entire group, a small standard deviation indicates a small difference between the individual scores and the mean scores and suggests higher agreement among the individuals. Therefore, the decrease in the standard

deviations from the first round to the second round indicates an increase in the degree of consensus.

Nevertheless, it should not be assumed that additional rounds would have led to greater consensus. In fact perfect consensus, in which the standard deviation of each issue is equal to zero, is realistically not achievable.

TABLE 5.1
ROUND TWO TOP TEN CRITICAL ISSUES

DON RANK	USN RANK	USMC RANK	CRITICAL ISSUES
1	1	1	Improving IS strategic planning
2	2	6	Integrating data processing, office automation, and telecommunication
3	3	7	Improving information security and control
4	4	3	Making effective use of data as an organizational resource
5t	6	5	Aligning an IS activity with the objectives of the entire command
5t	8	2	Improving the quality of software development
7	7	4	Facilitating and managing end user computing
8	5	8t	Increasing understanding of the role and contribution of IS
9	9	13t	*Establishing a streamlined, more efficient procurement process
10	10	12	Determining IS funding levels

t: Tied with another issue
*: New issue

TABLE 5.2
ROUND TWO COMBINED DON TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
7.36	3.69	85	85.0	Improving IS strategic planning
5.19	3.64	77	77.0	Integrating data processing, office automation, and telecommunication
4.72	3.78	75	75.0	Improving information security and control
4.48	3.25	75	75.0	Making effective use of data as an organizational resource
3.59	3.35	62	62.0	Aligning an IS activity with the objectives of the entire command
3.59	4.02	50	50.0	Improving the quality of software development
3.52	3.35	65	65.0	Facilitating and managing end user computing
3.24	3.46	58	58.0	Increasing understanding of the role and contribution of IS
2.09	2.85	46	46.0	*Establishing a streamlined, more efficient procurement process
2.00	2.65	46	46.0	Determining IS funding levels

D. USMC RANKINGS AND THE MRISP

This study complements the Marine Corps Mid-Range Information Systems Plan (MRISP). The MRISP is a seven year plan that describes the information resource needs of the U.S. Marine Corps. The plan assesses the current status and future direction of automatic data processing and data communications technology within the Marine Corps [Ref. 9].

TABLE 5.3
ROUND TWO U.S. NAVY TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
6.87	3.89	61	81.3	Improving IS strategic planning
5.72	3.64	60	80.0	Integrating data processing, office automation, and telecommunication
5.24	3.86	58	77.3	Improving information security and control
4.47	3.28	55	73.3	Making effective use of data as an organizational resource
3.48	3.56	45	60.0	Increasing understanding of the role and contribution of IS
3.45	3.25	47	62.7	Aligning an IS activity with the objectives of the entire command
3.35	3.31	47	62.7	Facilitating and managing end user computing
2.83	3.75	32	42.7	Improving the quality of software development
2.23	2.84	37	49.3	*Establishing a streamlined, more efficient procurement process
2.04	2.70	35	46.7	Determining IS funding levels

The plan includes an aggregate listing of the top ten problem areas identified by 26 departments, divisions, and field commands from Headquarters Marine Corps (HQMC) in Washington, D.C. The rankings were obtained from each of these 26 organizations which included a completed Ranking of Needed Improvement Areas as part of their IS planning submission to HQMC. The responding organizations chose and ranked their top ten problem areas from a listing of 30

TABLE 5.4
ROUND TWO U.S. MARINE CORPS TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
8.84	2.49	24	96.0	Improving IS strategic planning
5.88	3.90	18	72.0	Improving the quality of software development
4.52	3.15	20	80.0	Making effective use of data as an organizational resource
4.04	3.43	18	72.0	Facilitating and managing end user computing
4.00	3.59	15	60.0	Aligning an IS activity with the objectives of the entire command
3.60	3.14	17	68.0	Integrating data processing, office automation, and telecommunication
3.16	3.03	17	68.0	Improving information security and control
2.52	2.99	12	48.0	*Establishing standardized hardware, software, and systems
2.52	3.03	13	52.0	Increasing understanding of the role and contribution of IS
2.24	2.93	12	48.0	Measuring IS effectiveness and productivity

problem areas. One problem area listed as "Other" was designated for the respondents to write in and rank any problem area which they believed was not included among the other 29 problem areas. The number one issue received a score of 20, the number two issue received a score of 18, and so on, with the number ten issue receiving a score of two. However, average scores and standard deviations were not computed. Furthermore, the MRISP survey did not involve a Delphi

inquiry. Table 5.5 shows the top ten problem area of the 1990 MRISP.

TABLE 5.5
1990 MRISP TOP TEN PROBLEM AREAS

RANK	PROBLEM DESCRIPTION	SCORE
1	Current funding levels ability to meet the requirements of the user	1,386
2	Establishment of Local Area Networks and Base Area Networks	1,035
3	Ability to meet deployed/employed requirements for IRM support	934
4	End user computing hardware/software standards	929
5	Current automated information systems ability to meet the requirements of the user	694
6	Current user training ability to meet the requirements of the user	572
7	Ability of current end user computing equipment to meet the requirements of the user	530
8	Personnel staffing ability to meet the requirements of the user	526
9	Worldwide telecommunications support	482
10	Deployable modules of Class I systems	440

Though the wording of these top ten problem areas is different from that of the top ten critical issues of this study as well as the Brancheau and Wetherbe (1987) study, many of the problem areas and critical issues reflect similar concepts. For example, the number two ranked problem area encompasses "Integrating data processing, office automation, and telecommunication"; the number three ranked problem area encompasses "Improving IS strategic planning"; the number four ranked problem area encompasses "Improving the quality of

software development" and "Establishing standardized hardware, software, and systems"; and the number seven ranked problem area encompasses "Facilitating and managing end user computing." Thus, these four problem areas alone encompass five of the top ten critical issues identified by Marine Corps IS officers. Table 5.6 compares the MRISP top ten problem areas with the critical issues identified by Marine Corps IS officers. The top eight problem areas encompass nine of the top 15 issues.

TABLE 5.6
MRISP TOP TEN PROBLEM AREAS VS. USMC CRITICAL ISSUES

MRISP RANK	RD 1 RANK	RD 2 RANK	PROBLEM DESCRIPTION
1	9	12	Current funding levels ability to meet the requirements of the user
2	6	6	Establishment of Local Area Networks and Base Area Networks
3	1	1	Ability to meet deployed/employed requirements for IRM support
4	2,20	2,8	End user computing hardware/software standards
5	18	11	Current automated information systems ability to meet the requirements of the user
6	15	15	Current user training ability to meet the requirements of the user
7	4	4	Ability of current end user computing equipment to meet the requirements of the user
8	11,16	13,21	Personnel staffing ability to meet the requirements of the user
9	13	18	Worldwide telecommunications support
10	NR	NR	Deployable modules of Class I systems

NR: Not Ranked

VI. COMPARISONS WITH BRANCHEAU AND WETHERBE STUDY

A. INTRODUCTION

Though there are some major differences between this study and the Brancheau and Wetherbe (1987) study, the methodology of ranking the top ten critical issues is the same. Furthermore, both studies analyzed 26 critical issues including the same 19 issues. Therefore, it is possible to objectively compare the results of these two studies. Tables 6.1 to 6.4 as well as Tables F.1.2 to F.3.2 in Appendix F compare the combined DON rankings, the Navy rankings and the Marine Corps rankings to the civilian corporate rankings. Furthermore, Table G.1 in Appendix G compares the DON, Navy, and Marine Corps rankings with those of several other studies.

B. COMBINED DON COMPARISON

Six of the combined DON top ten critical issues were among the top ten critical issues ranked by civilian and corporate IS executives (Tables 6.1, F.1.1, and F.1.2). These same six issues were in the Round One, Round Two, and Round Three corporate rankings. Only "Improving IS strategic planning" and "Aligning an IS activity with the objectives of the entire command" had the same DON and corporate rankings. Furthermore, the degree of consensus among DON IS officers was similar to the degree of consensus among civilian IS

executives. Table 6.2 shows that the average standard deviations for the Top Ten issues as well as all 26 issues in Round One and Round Two of this study were very similar to those obtained during the first two rounds of the Brancheau and Wetherbe (1987) study.

TABLE 6.1
COMBINED DON COMPARISON OF TOP TEN CRITICAL ISSUES

DON RD 2 RANK	B&W RD 3 RANK	CRITICAL ISSUES
1	1	Improving IS strategic planning
2	10	Integrating data processing, office automation, and telecommunication
3	18	Improving information security and control
4	7	Making effective use of data as an organizational resoure
5t	5	Aligning an IS activity with the objectives of the entire command
5t	13	Improving the quality of software development
7	6	Facilitating and managing end user computing
8	4	Increasing understanding of the role and contribution of IS
9	NA	*Establishing a streamlined, more efficient procurement process
10	20	Determining IS funding levels

D: Dropped in Round 3 Questionnaire
t: Tied with another issue
*: New issue
NA: Not Analyzed in B&W Study

TABLE 6.2
AVERAGE STANDARD DEVIATIONS

ROUND AND STUDY	TOP TEN	ALL ISSUES
Round One	3.55	2.72
Round Two	3.40	2.50
Round One (Brancheau & Wetherbe)	3.48	3.06
Round Two (Brancheau & Wetherbe)	3.50	2.50
Round Three (Brancheau & Wetherbe)	2.59	1.95

C. USN COMPARISON

Six of the Navy's top ten critical issues were among the top ten critical issues ranked by civilian and corporate IS executives (Tables 6.3, F.2.1, and F.2.2). These same six issues were in both the Round Two and Round Three corporate rankings. Only "Improving IS strategic planning" had the same USN and corporate rankings.

D. USMC COMPARISON

Seven of the Marine Corps top ten critical issues were among the top ten critical issues ranked by civilian and corporate IS executives (Tables 6.4, F.3.1, and F.3.2). Six of these seven issues were in both the Round Two and Round Three corporate rankings. Only "Improving IS strategic planning" and "Aligning an IS activity with the objectives of the entire command" had the same DON and corporate rankings.

TABLE 6.3
U.S. NAVY COMPARISSON OF TOP TEN CRITICAL ISSUES

USN RD 2 RANK	B&W RD 3 RANK	CRITICAL ISSUES
1	1	Improving IS strategic planning
2	10	Integrating data processing, office automation, and telecommunication
3	18	Improving information security and control
4	7	Making effective use of data as an organizational resource
5	4	Increasing understanding of the role and contribution of IS
6	5	Aligning an IS activity with the objectives of the entire command
7	6	Facilitating and managing end user computing
8	13	Improving the quality of software development
9	NA	*Establishing a streamlined, more efficient procurement process
10	20	Determining IS funding levels

D: Dropped in Round 3 Questionnaire
t: Tied with another issue
*: New issue
NA: Not Analyzed in B&W Study

TABLE 6.4
U.S. MARINE CORPS COMPARISON OF TOP TEN CRITICAL ISSUES

USMC RD 2 RANK	B&W RD 3 RANK	CRITICAL ISSUES
1	1	Improving IS strategic planning
2	13	Improving the quality of software development
3	7	Making effective use of data as an organizational resource
4	3	Facilitating and managing end user computing
5	5	Aligning an IS activity with the objectives of the entire command
6	10	Integrating data processing, office automation and telecommunication
7	18	Improving information security and control
8	NA	*Establishing standardized hardware, software, and systems
9	4	Increasing understanding of the role and contribution of IS
10	9	Measuring IS effectiveness and productivity

D: Dropped in Round 3 Questionnaire
t: Tied with another issue
*: New issue
NA: Not Analyzed in B&W Study

VII. DISCUSSION

A. INTRODUCTION

IS issues can be grouped by categories of emphasis and by levels of decision-making. These categories and levels determine the types of problems that an organization is mostly concerned with.

Categories of emphasis consist of two kinds of issues: management type issues and technology type issues. Management type issues are related to managerial and organizational problems, whereas technology type issues are related to technology and application problems. Issues such as "Improving IS strategic planning" and "Aligning an IS activity with the objectives of the entire command" are generally management type issues. On the other hand, issues such as "Integrating data processing, office automation, and telecommunication" and "Improving information security and control" are generally technology type issues. Nevertheless, several issues such as "Improving the quality of software development" and "Facilitating and managing end user computing" are both managerial and technical in nature.

Levels of decision-making consist of three kinds of issues: strategic issues, tactical issues, and operational issues. Strategic issues are critical to top level managers

and officers. These issues are future oriented and involve long term policy planning. Their time span can range from several months to several years. Tactical issues are critical to middle level managers and department heads. These issues involve tactical planning and policy implementation. Their time span can range from several weeks to several months. Operational issues are critical to lower level managers and leaders. These issues are short term oriented and involve the day to day operations of the organization. Their time span can range from a few days to a several weeks.

B. KEY DIFFERENCE

Tables 7.1 and 7.2 show the Brancheau and Wetherbe as well as the DON top ten critical issues with their categories of emphasis and their levels of decision-making. Nine of the top ten corporate issues are management type issues. Similarly, seven of the DON top ten are management type issues. On the other hand, six of the corporate top ten issues are strategic in nature, while seven of the DON top ten are tactical in nature. Thus, civilian MIS managers are concerned mainly with strategic issues, while DON officers are concerned mainly with tactical issues.

This key difference between the focus of civilian managers and the focus of DON officers can be explained by the four issues which are in the DON top ten ranking but are not in the Brancheau and Wetherbe top ten ranking. All four of these

issues are tactical in nature. "Improving information security and control" obviously is extremely critical in the DON which must operate in an environment of tight secrecy and security in order to protect our national interests. It is easier to infiltrate or sabotage top secret documents by using a computer than by physically breaking into a military installation. "Improving the quality of software development" is a major concern especially because in recent years many new information systems in the Department of Defense, are years behind schedule and billions of dollars over budget [Ref. 10]. "Establishing a streamlined, more efficient procurement process" is also critical since current acquisition procedures are bureaucratic, complicated, and time consuming. By the time many systems are fully implemented, they are already several years behind the present technology. "Determining IS funding levels" is final concern in an era of $300 billion federal budget deficits, falling tax revenues, and cutbacks in military spending.

TABLE 7.1
BRANCHEAU AND WETHERBE TOP TEN CRITICAL ISSUES

B&W RANK	CATE-GORY	LEVEL	CRITICAL ISSUES
1	Man	Strat	Improving IS strategic planning
2	Man	Strat	Using information systems for competitive advantage
3	Man	Strat	Facilitating organizational learning and the use of IS
4	Man	Strat	Increasing understanding of the role and contribution of IS
5	Man	Strat	Aligning an IS activity with the objectives of the enterprise
6	Man	Tact	Facilitating and managing end-user computing
7	Man	Tact	Promoting effective use of the data resource
8	Man	Strat	Developing an information architecture
9	Man	Tact	Measuring IS effectiveness and productivity
10	Tech	Tact	Integrating data processing, office automation, factory automation, and telecommunication

Man: Management Type Issue
Tech: Technical Type Issue
Strat: Strategic Level of Decision Making
Tact: Tactical Level of Decision Making

TABLE 7.2
DON TOP TEN CRITICAL ISSUES

DON RANK	CATE-GORY	LEVEL	CRITICAL ISSUES
1	Man	Strat	Improving IS strategic planning
2	Tech	Tact	Integrating data processing, office automation, and telecommunication
3	Tech	Tact	Improving information security and control
4	Man	Tact	Making effective use of data as a corporate resource
5	Man	Strat	Aligning an IS activity with the objectives of the entire command
6	Tech	Tact	Improving the quality of software development
7	Man	Tact	Facilitating and managaing end user computing
8	Man	Strat	Increasing understanding of the role and contribution of IS
9	Man	Tact	Establishing a streamlined more efficient procurement process
10	Man	Tact	Determing IS funding levels

Man: Management Type Issue
Tech: Technical Type Issue
Strat: Strategic Level of Decision Making
Tact: Tactical Level of Decision Making

VIII. CONCLUSION

A. REVIEW

This study addressed five objectives regarding the major IS issues that DON information systems officers are facing today. U.S. Navy information systems officers and U.S. Marine Corps IS officers encounter the same major IS problems. Naval officers and Marine officers ranked the same eight issues among their top ten IS critical issues, though they differed in how they ranked most of these issue. "Improving IS strategic planning" by far, is the number one IS issue that they face.

DON information systems officers and corporate IS executives generally encounter the same major IS issues. DON officers and corporate executives ranked the same six issues among their top ten IS critical issues, though they differed in how they ranked most of these issues. Again, "Improving IS strategic planning" by far, is the number one issue that they face.

B. RECOMMENDATIONS

It is advisable that this study be performed DON wide periodically at least every three years. As Brancheau and Wetherbe demonstrated in their two studies, in the rapidly

changing environment of MIS, the critical issues faced by information systems managers change from time to time.

These issues should guide the formulation of IS standards by functional area work groups under the Corporate Information Management (CIM) initiatives to consolidate and standardize information resources and systems DOD wide within the ten years. As the CIM strategies begin to unfold, it is essential for the DON to be aware of the critical IS issues that their IS officers are facing. The CIM strategies of unification and standardization should address the majority of the top ten critical IS issues identified by Navy and Marine Corps IS officers by:

1. improving IS strategic planning (the number one ranked DON critical issue)
2. integrating data processing, office automation, and telecommunication (the number two ranked issue)
3. making effective use of data as an organizational resource (the number four ranked issue)
4. improving the quality of software development (the number five ranked issue)
5. aligning an IS activity with the objectives of the command, DON, and DOD (the number six ranked issue)
6. increasing understanding of the role and importance of IS (the number eight ranked issue).

C. CHANGES

When this study is done again, three things should be done differently:

1. the questionnaires should be mailed to both civilian and military DON information systems managers and not just NPS graduates to ensure a greater and more diverse population of respondents

2. the questionnaires should be mailed only to DON information systems managers who are presently holding an IS billet or who have recently completed a tour in an IS billet to ensure that the critical issues ranked are current and the respondents doing the ranking are well informed

3. the cover letters accompanying the questionnaires should state a cut-off date that the questionnaires have to be returned by in order to speed up the return of the questionnaires.

APPENDIX A: ROUND ONE QUESTIONNAIRE

TABLE A.1.1
ROUND ONE STATISTICS AND RESONSE RATES

	USMC	USN	DON
Surveys mailed to NPS graduates	64	295	359
Undeliverable surveys returned by the postal service	3	20	23
Surveys actually received by graduates	61	275	336
Surveys returned by NPS graduates	46	170	216
Erroneous surveys returned by graduates	0	6	6
Blank surveys returned by graduates without MIS experience	2	12	14
Valid surveys returned by NPS graduates	44	152	196
Valid surveys from graduates without MIS experience	4	35	39
Valid surveys from graduates with MIS experience	40	117	157
Percentage of surveys returned by NPS graduates	75	62	64
Percentage of valid surveys from graduates	72	55	58
Percentage of valid surveys from graduates with MIS experience	66	43	47

April 9, 1990

TEN CRITICAL ISSUES FOR INFORMATION SYSTEMS MANAGERS

I am trying to determine the top ten management issues facing information systems managers in the Department of the Navy. Using a survey adapted from a similar one used among civilian and corporate MIS managers by James C. Wetherbe and other IS researchers, I want to assess the major problems that MIS managers will encounter after they graduate from the Naval Postgraduate School computer technology curricula.

Please take a few minutes to complete this survey and return it to me in the stamped, self-addressed envelope.

Thank you for your time.

Rafael A. Gacel
Captain USMC

P.S.: If you would like a copy of the completed study, simply fill out the mailing label on the last page of the questionnaire form, and I will send it to you around December of this year.

SURVEY OF TOP ISSUES IN MANAGING MILITARY INFORMATION SYSTEMS

What do you think are the ten most critical issues you face as a manager of computer/information systems in the Department of the Navy?

First, read over the following 20 issues about managing information systems.

Second, choose your ten most critical issues from the list below. Rank each of your ten issues using the numbers 1 to 10. Number 1 indicates your highest priority issue. Beyond the 20 issues provided below, use the last page to add your other issues, and include them in your top ten ranking. Please do not rank more than ten issues. Feel free to change the wording of the issues, modify the rationale, or add your personal comments.

Your
Ranking Issues and their rationales:

_____ *Issue:* Managing the impact of artificial intelligence (AI)

Rationale: AI may prove to be a major force transforming information systems (IS) and its parent command, but very little is known about managing this increasingly feasible technology.

_____ *Issue:* Making effective use of computer graphics

Rationale: Graphics offers an effective way to present information, but problems need to be resolved in using them interactively and remotely, and integrating them with available reporting mechanisms.

_____ *Issue:* Increasing understanding of the role and contribution of IS

Rationale: IS is often viewed as an overhead expense with little appreciation of its contributions to the command. This can lead to inadvertent cuts in funding and limit the use of IS as a competitive weapon.

_____ *Issue:* Planning and implementing a telecommunication system

Rationale: Communication is the lifeblood of the command, but rapid and major changes in this industry make this task very difficult.

_____ *Issue:* Improving information security and control

Rationale: As commands become increasingly dependent on IS there is a greater risk of disclosure, destruction and alteration of data, and disruption of information services.

_____ *Issue:* Improving IS strategic planning

Rationale: Strategic planning is critical to the command's success in integrating strategic and information systems planning to make competitive use of information systems technologies.

_____ *Issue:* Facilitating and managing end-user computing

Rationale: The proliferation of end-user computing through personal computers and information centers offers the promise of improved productivity, but also the dangers of poor managerial control of a powerful resource.

_____ *Issue:* Integrating data processing, office automation, and telecommunication

Rationale: There is now the capability to integrate systems based on these diverse technologies, but planning and management problems remain.

_____ *Issue:* Planning and managing of the applications portfolio

Rationale: The applications portfolio is growing in size, complexity, and resulting maintenance costs. Despite the longevity of the maintenance problem, very little is known about managing it effectively.

_____ *Issue:* Measuring IS effectiveness and productivity

Rationale: Measuring IS performance is crucial to managing it. Assessing performance is becoming critical as commands invest more in information systems.

_____ *Issue:* Improving the quality of software development

Rationale: The applications development backlog remains at unacceptably high levels. End-users are growing impatient, while systems development personnel costs are rising.

_____ *Issue:* Determining IS funding levels

Rationale: There is no generally acceptable way of establishing the level of IS funding relative to the other funding needs of the command. This issue puts both IS and general managers at a disadvantage.

_____ *Issue:* Managing data and document storage

Rationale: There is a need now to provide for large data and document storage requirements. These requirements will be even greater in the future.

_____ *Issue:* Planning, implementing, and managing office automation

Rationale: Office automation is being implemented to improve "white collar" productivity. Determining how this should be done and what role an IS activity should play is a problem.

_____ *Issue:* Promoting the learning and use of IS technologies

Rationale: The commands that will prosper are those that can integrate new IS technologies into their overall operation.

_____ *Issue:* Developing and implementing decision support systems

Rationale: Improving the effectiveness of managers is a critical objective for IS. There has been much promise but little success in this area.

_____ *Issue:* Making effective use of data as an organizational resource

Rationale: The command's data resource is growing in size, value, and complexity, even though it remains largely under used.

_____ *Issue:* Specifying, recruiting, and developing human resources for IS

Rationale: Present and future shortages of qualified IS personnel threaten an IS activity's ability to keep up with the information needs of its user commands.

_____ *Issue:* Aligning an IS activity with the objectives of the entire command

Rationale: The effectiveness with which an IS activity can support an entire command's information needs is affected by its position within the overall command.

_____ *Issue:* High turnover of IS personnel with critical skills

Rationale: High turnover rates of skilled IS people due to transfers, temporary duty and other reasons create discontinuity in an IS activity.

TURN TO NEXT PAGE TO ADD YOUR OWN ISSUES
(AND RANK THEM) ->>

Please write in and rank issues that you want to add to this survey:

Your Ranking _____ Your Issues: _____

_____ *Issue:* _____

Rationale: _____

_____

_____

_____ *Issue:* _____

Rationale: _____

_____

_____

_____ *Issue:* _____

Rationale: _____

_____

_____

_____ *Issue:* _____

Rationale: _____

_____

_____

TURN TO NEXT PAGE ->

Your Name: _____

Rank: _____

NPS Graduation Date (month/year): _____

Is your current job a MIS-related billet (circle one)? NO YES

The title of your current job: _____

The titles of previous jobs you have held that were MIS-related:	Dates during which you held this job:
_____	_____
_____	_____
_____	_____
_____	_____

Again, my hearty thanks for the time that you have taken to respond to this questionnaire.

Please use the enclosed stamped, addressed envelope to return the survey to me.

Captain Rafael A. Gacel
SMC 2887
NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943

TURN TO NEXT PAGE TO REQUEST COPY OF SURVEY RESULTS ->

If you would like a copy of the completed study, please fill out this mailing label:

RANK NAME

MAILING ADDRESS

CITY STATE ZIP CODE

APPENDIX B: ROUND ONE RANKINGS

TABLE B.1.1
ROUND ONE TOP TEN CRITICAL ISSUES

DON RANK	USN RANK	USMC RANK	CRITICAL ISSUES
1	3	1	Improving IS strategic planning
2	1	10	Improving information security and control
3	2	5	Integrating data processing, office automation, and telecommunication
4	4	3	Facilitating and managing end user computing
5	5	6	Increasing understanding of the role and contribution of IS
6	6	7t	Making effective use of data as an organizational resource
7	8	7t	Determining IS funding levels
8	9	4	Aligning an IS activity with the objectives of the entire command
9	11	2	Improving the quality of software development
10	7	13t	Planning and implementing a telecommunication system

t: Tied with another issue
*: New issue

TABLE B.1.2
ROUND ONE ADDITIONAL CRITICAL ISSUES

DON RANK	USN RANK	USMC RANK	CRITICAL ISSUES
11	10	12	Promoting the learning and use of IS technologies
12	14	9	Measuring IS effectiveness and productivity
13	15	11	Reducing the high turnover of IS personnel with critical skills
14	12	17	Planning, implementing, and managing office automation
15	13	16	Specifying, recruiting, and developing human resources for IS
16	16	14	Planning and managing of the applications portfolio
17	17	15	Managing data and document storage
18	18	19	Developing and implementing decision support systems
19	19t	21	*Establishing a streamlined, more efficient procurement process
20	19t	23	Making effective use of computer graphics
21	23	18	*Improving the understanding of end user requirements
22	22	20	*Establishing standardized hardware, software, and systems
23	21	25t	*Establishing a career path for IS trained officers
24	25	22	*Adopting improved project development and management capabilities
25	26	24	*Training IS officers periodically
26	24	25t	Managing the impact of artificial intelligence

t: Tied with another issue
*: New issue

TABLE B.2.1
ROUND ONE COMBINED DON TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
4.24	3.72	106	67.5	Improving IS strategic planning
3.80	3.66	103	65.6	Improving information security and control
3.76	3.34	107	68.2	Integrating data processing, office automation, and telecommunication
3.68	3.37	112	71.3	Facilitating and managing end user computing
3.43	3.87	89	56.7	Increasing understanding of the role and contribution of IS
3.29	3.31	96	61.1	Making effective use of data as an organizational resource
3.13	3.67	80	51.0	Determining IS funding levels
3.08	3.57	79	50.3	Aligning an IS activity with the objectives of the entire command
3.04	3.57	83	52.9	Improving the quality of software development
2.87	3.41	78	49.7	Planning and implementing a telecommunication system

TABLE B.2.2
ROUND ONE COMBINED DON ADDITIONAL CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
2.50	3.00	81	51.6	Promoting the learning and use of IS technologies
2.45	3.24	74	47.1	Measuring IS effectiveness and productivity
2.20	3.19	69	43.9	Reducing the high turnover of IS personnel with critical skills
2.16	3.11	69	43.9	Planning, implementing, and managing office automation
2.15	3.26	62	39.5	Specifying, recruiting, and developing human resources for IS
1.73	2.84	57	36.3	Planning and managing of the applications portfolio
1.59	2.45	61	38.9	Managing data and document storage
1.06	2.06	46	29.3	Developing and implementing decision support systems
0.64	2.35	12	7.6	*Establishing a streamlined, more efficient procurement process
0.58	1.47	29	18.5	Making effective use of computer graphics
0.36	1.83	6	3.8	*Improving the understanding of end user requirements
0.35	1.66	8	5.1	*Establishing standardized hardware, software, and systems
0.24	1.46	3	1.9	*Establishing a career path for IS trained officers
0.21	1.32	4	2.5	Adopting improved project development and management capabilities
0.17	1.08	4	2.5	*Training IS officers periodically
0.14	0.93	3	1.9	Managing the impact of artificial intelligence

TABLE B.3.1
ROUND ONE USN TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
4.09	3.72	79	67.5	Improving information security and control
3.85	3.44	80	68.4	Integrating data processing, office automation, and telecommunication
3.83	3.70	73	62.4	Improving IS strategic planning
3.56	3.29	83	70.9	Facilitating and managing end user computing
3.44	3.89	68	58.1	Increasing understanding of the role and contribution of IS
3.27	3.30	71	60.7	Making effective use of data as an organizational resource
3.21	3.51	63	53.8	Planning and implementing a telecommunication system
3.06	3.71	59	50.4	Determining IS funding levels
2.74	3.37	56	47.9	Aligning an IS activity with the objectives of the entire command
2.70	3.11	62	53.0	Promoting the learning and use of IS technologies

TABLE B.3.2
ROUND ONE USN ADDITIONAL CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
2.63	3.41	55	47.0	Improving the quality of software development
2.37	3.11	58	49.6	Planning, implementing, and managing office automation
2.29	3.28	49	41.9	Specifying, recruiting, and developing human resources for IS
2.24	3.21	49	41.9	Measuring IS effectiveness and productivity
2.20	3.24	49	41.9	Reducing the high turnover of personnel with critical skills
1.70	2.83	43	36.8	Planning and managing of the applications portfolio
1.51	2.47	44	37.6	Managing data and document storage
1.18	2.19	36	30.8	Developing and implementing decision support systems
0.68	1.64	22	18.8	Making effective use of computer graphics
0.68	2.40	9	7.7	*Establishing a streamlined, more efficient procurement process
0.32	1.69	3	2.6	*Establishing a career path for IS trained officers
0.27	1.52	4	3.4	*Establishing standardized hardware, software, and systems
0.23	1.43	3	2.6	*Improving the understanding of end user requirements
0.19	1.07	3	2.6	Managing the impact of artificial intelligence
0.16	1.23	2	1.7	*Adopting improved project development and management capabilities
0.15	1.02	3	2.6	Training IS officers periodically

TABLE B.4.1
ROUND ONE USMC TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
5.43	3.53	33	82.5	Improving IS strategic planning
4.25	3.75	28	70.0	Improving the quality of software development
4.03	3.57	29	72.5	Facilitating and managing end user computing
3.95	3.97	23	57.5	Aligning an IS activity with the objectives of the entire command
3.53	3.12	27	67.5	Integrating data processing, office automation, and telecommunication
3.40	3.81	21	52.5	Increasing understanding of the role and contribution of IS
3.33	3.36	25	62.5	Making effective use of data as an organizational resource
3.33	3.55	21	52.5	Determining IS funding levels
3.08	3.27	25	62.5	Measuring IS effectiveness and productivity
2.95	3.17	24	60.0	Improving information security and control

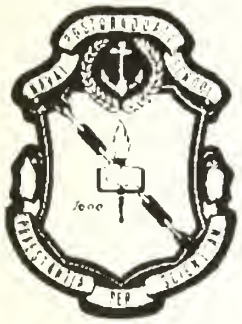
TABLE B.4.2
ROUND ONE USMC ADDITIONAL CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & in TOP	PCT. TEN	CRITICAL ISSUES
2.20	3.02	20	50.0	Reducing the high turnover of IS personnel with critical skills
1.90	2.55	19	47.5	Promoting the learning and use of IS technologies
1.88	2.89	15	37.5	Planning and implementing a telecommunication system
1.83	2.85	14	35.0	Planning and managing of the applications portfolio
1.80	2.38	17	42.5	Managing data and document storage
1.75	3.17	13	32.5	Specifying, recruiting, and developing human resources for IS
1.55	3.02	11	27.5	Planning, implementing, and managing office automation
0.75	2.63	3	7.5	*Improving the understanding of end user requirements
0.70	1.54	10	25.0	Developing and implementing decision support systems
0.58	2.01	4	10.0	*Establishing standardized hardware, software, and systems
0.55	2.19	3	7.5	*Establishing a streamlined, more efficient procurement process
0.35	1.54	2	5.0	*Adopting improved project development and management capabilities
0.30	0.75	7	17.5	Making effective use of computer graphics
0.20	1.25	1	2.5	*Training IS officers periodically
0.00	0.00	0	0.0	*Establishing a career path for IS trained officers
0.00	0.00	0	0.0	Managing the impact of artificial intelligence

APPENDIX C: ROUND TWO QUESTIONNAIRE

TABLE C.1.1
ROUND TWO STATISTICS AND RESPONSE RATES

	USMC	USN	DON
Surveys mailed to NPS graduates	40	117	157
Undeliverable surveys returned by the postal service	3	3	6
Surveys actually received by graduates	37	114	151
Surveys returned by NPS graduates	25	78	103
Erroneous surveys returned by graduates	0	3	3
Valid surveys returned by NPS graduates	25	75	100
Percentage of surveys returned by NPS graduates	68	68	68
Percentage of valid surveys from graduates	68	66	66



July 23, 1990

TEN CRITICAL ISSUES FOR DON INFORMATION SYSTEMS MANAGERS

I greatly appreciate your active participation in this important study. Nearly 200 of you responded to the initial survey, and nearly 100 of you identified at least one additional critical issue. In this last phase of my research project, I am using a Delphi inquiry to determine how much consensus there is among you regarding these major issues. In this final questionnaire I have included six additional critical issues that were identified by you, and I have tabulated your initial rankings. You may now rank what you think are the top ten issues facing you as an MIS officer in the DON, and take into account these new issues and the group rankings if you desire.

Please take a few minutes to complete this survey and return it to me at your earliest convenience in the self-addressed stamped envelope.

Thank you for your time

Rafael A. Gacel
Captain USMC

P.S.: If you would like a copy of the completed study, but you did not fill out a mailing label on the initial survey, simply fill out the mailing label on the last page of the questionnaire, and I will send it to you around December of this year.

RANK _____ NAME _____ MONTHS OF IS EXPERIENCE _____

SURVEY OF TOP ISSUES IN MANAGING DON INFORMATION SYSTEMS

What do you think are the ten most critical issues you face as a manager of computer/information systems in th Department of the Navy?

Please look at both the USN and USMC rankings of the following 26 issues which are listed in order by overa DON ranking. Rationales for these issues are provided in the following pages. RANK ONLY YOUR TOP TE ISSUES. A rank of 1 indicates your most critical issue. Feel free to change the wording of the issues, modify th rationales, or add your personal comments.

USN Ranking	USMC Ranking	Your Final Ranking	Critical Issues:
2	1	____	Improving IS strategic planning
1	10	____	Improving information security and control
3	5	____	Integrating data processing, office automation, and telecommunication
5	3	____	Facilitating and managing end user computing
4	6	____	Increasing understanding of the role and contribution of IS
6	7	____	Making effective use of data as an organizational resource
8	8	____	Determining IS funding levels
9	4	____	Aligning an IS activity with the objectives of the entire command
11	2	____	Improving the quality of software development
7	14t	____	Planning and implementing a telecommunication system
10	12	____	Promoting the learning and use of IS technologies
12	9	____	Measuring IS effectiveness and productivity
15	11	____	Reducing the high turnover of IS personnel with critical skills

USN Ranking	USMC Ranking	Your Final Ranking	Critical Issues:
13	16t	____	Planning, implementing, and managing office automation
14	16t	____	Specifying, recruiting, and developing human resources for IS
16	13	____	Planning and managing of the applications portfolio
17	14t	____	Managing data and document storage
18	19	____	Developing and implementing decision support systems
19t	22t	____	*Establishing a streamlined, more efficient procurement process
19t	22t	____	Making effective use of computer graphics
22	20	____	*Establishing standardized hardware, software, and systems
25t	18	____	*Improving the understanding of end user requirements
21	25t	____	*Establishing a career path for IS trained officers
24	21	____	*Adopting improved project development and management capabilities
25t	24	____	*Training IS officers periodically
23	25t	____	Managing the impact of artificial intelligence

t: tied with one or more other issues

*: new Issue

TURN TO THE NEXT PAGE TO SEE THE OVERALL DON RANKING AND THE RATIONALES ->

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OVERALL DON RANKING AND RATIONALES

DON
Rank Critical Issues and their Rationales:

1 *Issue:* Improving IS strategic planning

Rationale: Strategic planning is critical to the command's success in integrating strategic and informati systems planning to make competitive use of information systems technologies.

2 *Issue:* Improving information security and control

Rationale: As commands become increasingly dependent on IS there is a greater risk of disclosur destruction and alteration of data, and disruption of information services.

3 *Issue:* Integrating data processing, office automation, and telecommunication

Rationale: There is now the capability to integrate systems based on these diverse technologies, b planning and management problems remain.

4 *Issue:* Facilitating and managing end-user computing

Rationale: The proliferation of end-user computing through personal computers and information cente offers the promise of improved productivity, but also the dangers of poor managerial control of a power resource.

5 *Issue:* Increasing understanding of the role and contribution of IS

Rationale: IS is often viewed as an overhead expense with little appreciation of its contributions to t command. This can lead to inadvertent cuts in funding and limit the use of IS as a competitive weapo

6 *Issue:* Making effective use of data as an organizational resource

Rationale: The command's data resource is growing in size, value, and complexity, even though it remai largely under used.

7 *Issue:* Determining IS funding levels

Rationale: There is no generally acceptable way of establishing the level of IS funding relative to the oth funding needs of the command. This issue puts both IS and general managers at a disadvantage.

DON
Rank Critical Issues and their Rationales:

8 *Issue:* Aligning an IS activity with the objectives of the entire command

Rationale: The effectiveness with which an IS activity can support an entire command's information needs is affected by its position within the overall command.

9 *Issue:* Improving the quality of software development

Rationale: The applications development backlog remains at unacceptably high levels. End-users are growing impatient, while systems development personnel costs are rising.

10 *Issue:* Planning and implementing a telecommunication system

Rationale: Communication is the lifeblood of the command, but rapid and major changes in this industry make this task very difficult.

11 *Issue:* Promoting the learning and use of IS technologies

Rationale: The commands that will prosper are those that can integrate new IS technologies into their overall operation.

12 *Issue:* Measuring IS effectiveness and productivity

Rationale: Measuring IS performance is crucial to managing it. Assessing performance is becoming critical as commands invest more in information systems.

13 *Issue:* Reducing the high turnover of IS personnel with critical skills

Rationale: High turnover rates of skilled IS people due to transfers, temporary duty, separations, and other reasons create project cancellations, backlogs, and other discontinuities in an IS activity.

14 *Issue:* Planning, implementing, and managing office automation

Rationale: Office automation is being implemented to improve "white collar" productivity. Determining how this should be done and what role an IS activity should play is a problem.

15 *Issue:* Specifying, recruiting, and developing human resources for IS

Rationale: Present and future shortages of qualified IS personnel threaten an IS activity's ability to keep up with the information needs of its user commands.

DON
Rank Critical Issues and their Rationales:

16 *Issue:* Planning and managing of the applications portfolio

Rationale: The applications portfolio is growing in size, complexity, and resulting maintenance cost Despite the longevity of the maintenance problem, very little is known about managing it effectively.

17 *Issue:* Managing data and document storage

Rationale: There is a need now to provide for large data and document storage requirements. Thes requirements will be even greater in the future.

18 *Issue:* Developing and implementing decision support systems

Rationale: Improving the effectiveness of managers is a critical objective for IS. There has been muc promise but little success in this area.

19t *Issue:* *Establishing a streamlined, more efficient procurement process

Rationale: The IS acquisition process is bureaucratic, inefficient, and slow. By the time complex system are fully implemented, they are approaching technical obsolescence.

19t *Issue:* Making effective use of computer graphics

Rationale: Graphics offers an effective way to present information, but problems need to be resolved using them interactively and remotely, and integrating them with available reporting mechanisms.

21 *Issue:* *Establishing standardized hardware, software, and systems

Rationale: Functional standardization of hardware and software products will increase end user productivi by reducing individual acceptance and training time, and save money by reducing multiple an incompatible systems.

22 *Issue:* *Improving the understanding of end user requirements

Rationale: A major problem in the systems development process is implementing systems that fail deliver what the end users needed.

DON
Rank Critical Issues and their Rationales:

23 *Issue:* *Establishing a career path for IS trained officers

Rationale: Officers trained in IS are not utilized effectively. For example, many are assigned to at most one tour in an IS billet or rotated from an IS billet to a non IS billet.

24 *Issue:* *Adopting improved project development and management capabilities

Rationale: Project development and management can be enhanced by incorporating modern systems development methodologies and tools, and/or project management techniques and tools.

25 *Issue:* *Training IS officers periodically

Rationale: Is officers need refresher courses and/or specialized training especially when they return to an IS billet after serving in a non IS billet.

26 *Issue:* Managing the impact of artificial intelligence

Rationale: AI may prove to be a major force transforming information systems and its parent command, but very little is known about managing this increasingly feasible technology.

t: tied with one or more other issues

*: New Issue

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If you would like a copy of the completed study, please fill out this mailing label:

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CITY STATE ZIP CODE

APPENDIX D: ROUND TWO RANKINGS

TABLE D.1.1
ROUND TWO TOP TEN CRITICAL ISSUES

DON RANK	USN RANK	USMC RANK	CRITICAL ISSUES
1	1	1	Improving IS strategic planning
2	2	6	Integrating data processing, office automation, and telecommunication
3	3	7	Improving information security and control
4	4	3	Making effective use of data as an organizational resource
5t	6	5	Aligning an IS activity with the objectives of the entire command
5t	8	2	Improving the quality of software development
7	7	4	Facilitating and managing end user computing
8	5	8t	Increasing understanding of the role and contribution of IS
9	9	13t	*Establishing a streamlined, more efficient procurement process
10	10	12	Determining IS funding levels

t: Tied with another issue
*: New issue

TABLE D.1.2
ROUND TWO ADDITIONAL CRITICAL ISSUES

DON RANK	USN RANK	USMC RANK	CRITICAL ISSUES
11	11	10	Measuring IS effectiveness and productivity
12	15	8t	*Establishing standardized hardware, software, and systems
13	13	11	*Improving the understanding of end user requirements
14	12	15	Promoting, the learning and use of IS technologies
15	14	23	*Establishing a career path for IS trained officers
16	16	18t	Planning and implementing a telecommunication system
17	17	13t	Reducing the high turnover of IS personnel with critical skills
18	18	16	*Adopting improved project development and management capabilities
19t	20	20	Managing data and document storage
19t	19	22	Planning, implementing, and managing office automation
21	22	17	Planning and managing of the applications portfolio
22	21	24	*Training IS officers periodically
23	24	18t	Developing and implementing decision support systems
24	23	21	Specifying, recruiting, and developing human resources for IS
25	25	25t	Making effective use of computer graphics
26	26	25t	Managing the impact of artificial intelligence

t: Tied with another issue
*: New issues

TABLE D.2.1
ROUND TWO COMBINED DON TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & in TOP	PCT. TEN	CRITICAL ISSUES
7.36	3.69	85	85.0	Improving IS strategic planning
5.19	3.64	77	77.0	Integrating data processing, office automation, and telecommunication
4.72	3.78	75	75.0	Improving information security and control
4.48	3.25	75	75.0	Making effective use of data as an organizational resource
3.59	3.35	62	62.0	Aligning an IS activity with the objectives of the entire command
3.59	4.02	50	50.0	Improving the quality of software development
3.52	3.35	65	65.0	Facilitating and managing end user computing
3.24	3.46	58	58.0	Increasing understanding of the role and contribution of IS
2.09	2.85	46	46.0	*Establishing a streamlined, more efficient procurement process
2.00	2.65	46	46.0	Determining IS funding levels

TABLE D.2.2
ROUND TWO COMBINED DON ADDITIONAL CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
1.99	2.75	45	45.0	Measuring IS effectiveness and productivity
1.65	2.74	34	34.0	*Establishing standardized hardware, software, and systems
1.63	2.69	34	34.0	*Improving the understanding of end user requirements
1.62	2.38	44	44.0	Promoting the learning and use of IS technologies
1.20	2.49	28	28.0	*Establishing a career path for IS trained officers
1.18	2.43	25	25.0	Planning and implementing a telecommunication system
1.17	2.24	31	31.0	Reducing the high turnover of IS personnel with critical skills
0.93	2.26	18	18.0	*Adopting improved project development and management capabilities
0.71	1.72	17	17.0	Managing data and document storage
0.71	1.82	20	20.0	Planning, implementing, and managing office automation
0.68	1.78	18	18.0	Planning and managing of the applications portfolio
0.58	1.77	14	14.0	*Training IS officers periodically
0.54	1.60	12	12.0	Developing and implementing decision support systems
0.49	1.31	18	18.0	Specifying, recruiting, and developing human resources for IS
0.11	0.77	2	2.0	Making effective use of computer graphics
0.03	0.30	1	1.0	Managing the impact of artificial intelligence

TABLE D.3.1
ROUND TWO U.S. NAVY TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
6.87	3.89	61	81.3	Improving IS strategic planning
5.72	3.64	60	80.0	Integrating data processing, office automation, and telecommunication
5.24	3.86	58	77.3	Improving information security and control
4.47	3.28	55	73.3	Making effective use of data as an organizational resource
3.48	3.56	45	60.0	Increasing understanding of the role and contribution of IS
3.45	3.25	47	62.7	Aligning an IS activity with the objectives of the entire command
3.35	3.31	47	62.7	Facilitating and managing end user computing
2.83	3.75	32	42.7	Improving the quality of software development
2.23	2.84	37	49.3	*Establishing a streamlined, more efficient procurement process
2.04	2.70	35	46.7	Determining IS funding levels

TABLE D.3.2
ROUND TWO U.S. NAVY ADDITIONAL CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
1.91	2.68	31	41.3	Measuring IS effectiveness and productivity
1.67	2.49	32	42.7	Promoting the learning and use of IS technologies
1.53	2.66	23	30.7	*Improving the understanding of end user requirements
1.52	2.71	27	36.0	*Establishing a career path for IS trained officers
1.36	2.59	22	29.3	*Establishing standardized hardware. software, and systems
1.35	2.56	21	28.0	Planning and implementing a telecommunication system
1.00	2.07	21	28.0	Reducing the high turnover of IS personnel with critical skills
0.87	2.19	13	17.3	*Adopting improved project management capabilities
0.84	1.88	17	22.7	Planning, implementing, and managing office automation
0.76	1.88	14	18.7	Managing data and document storage
0.75	2.00	13	17.3	*Training IS officers periodically
0.60	1.48	13	17.3	Planning and managing of the applications portfolio
0.51	1.36	14	18.7	Specifying, recruiting, and developing human resources for IS
0.49	1.47	9	12.0	Developing and implementing decision support systems
0.15	0.89	2	2.7	Making effective use of computer graphics
0.04	0.34	1	1.3	Managing the impact of artificial intelligence

TABLE D.4.1
ROUND TWO U.S. MARINE CORPS TOP TEN CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
8.84	2.49	24	96.0	Improving IS strategic planning
5.88	3.90	18	72.0	Improving the quality of software development
4.52	3.15	20	80.0	Making effective use of data as an organizational resource
4.04	3.43	18	72.0	Facilitating and managing end user computing
4.00	3.59	15	60.0	Aligning an IS activity with the objectives of the entire command
3.60	3.14	17	68.0	Integrating data processing, office automation, and telecommunication
3.16	3.03	17	68.0	Improving information security and control
2.52	2.99	12	48.0	*Establishing standardized hardware, software, and systems
2.52	3.03	13	52.0	Increasing understanding of the role and contribution of IS
2.24	2.93	12	48.0	Measuring IS effectiveness and productivity

TABLE D.4.2
ROUND TWO U.S. MARINE CORPS ADDITIONAL CRITICAL ISSUES

MEAN SCORE	STAN. DEV.	NO. & PCT. in TOP TEN		CRITICAL ISSUES
1.92	2.74	11	44.0	*Improving the understanding of end user requirements
1.88	2.49	11	44.0	Determining IS funding levels
1.68	2.62	10	40.0	Reducing the high turnover of IS personnel with critical skills
1.68	2.85	9	36.0	*Establishing a streamlined, more effciient, procurement process
1.48	2.00	14	56.0	Promoting the learning and use of IS technologies
1.12	2.42	5	20.0	*Adopting improved project development and management capabilities
0.92	2.46	5	20.0	Planning and managing of the applications portfolio
0.68	1.91	4	16.0	Planning and implementing a telecommunication system
0.68	1.93	3	12.0	Developing and implementing decision support systems
0.56	1.58	3	12.0	Managing data and document storage
0.44	1.13	4	16.0	Specifying, recruiting, and developing human resources for IS
0.32	0.97	3	12.0	Planning, implementing, and managing office automation
0.24	1.18	1	4.0	*Establishing a career path for IS trained officers
0.08	0.39	1	4.0	*Training IS officers periodically
0.00	0.00	0	0.0	Making effective use of computer graphics
0.00	0.00	0	0.0	Managing the impact of artificial intelligence

APPENDIX E: THE 26 CRITICAL ISSUES AND THEIR RATIONALES IN COMBINED DON RANK ORDER

DON RANK

1 Issue: Improving IS strategic planning

Rationale: Strategic planning is critical to the command's success in integrating strategic and information systems planning to make competitive use of information systems technologies.

2 Issue: Integrating data processing, office automation, and telecommunication

Rationale: There is now the capability to integrate systems based on these diverse technologies, but planning and management problems remain.

3 Issue: Improving information security and control

Rationale: As commands become increasingly dependent on IS there is a greater risk of disclosure, destruction and alteration of data, and disruption of information services.

4 Issue: Making effective use of data as an organizational resource

Rationale: The command's data resource is growing in size, value, and complexity, even though it remains largely under used.

5t Issue: Aligning an IS activity with the objectives of the entire command

Rationale: The effectiveness with which an IS activity can support an entire command's information needs is affected by its position within the overall command.

DON
RANK

5t Issue: Improving the quality of software development

Rationale: The applications development backlog remains at unacceptably high levels. End-users are growing impatient, while systems development personnel costs are rising.

7 Issue: Facilitating and managing end-user computing

Rationale: The proliferation of end-user computing through personal computers and information centers offers the promise of improved productivity, but also the dangers of poor managerial control of a powerful resource.

8 Issue: Increasing understanding of the role and contribution of IS

Rationale: IS is often viewed as an overhead expense with little appreciation of its contributions to the command. This can lead to inadvertent cuts in funding and limit the use of IS as a competitive weapon.

9 Issue: *Establishing a streamlined, more efficient procurement process

Rationale: The IS acquisition process is bureaucratic, inefficient, and slow. By the time complex systems are fully implemented, they are approaching technical obsolescence.

10 Issue: Determining IS funding levels

Rationale: There is no generally acceptable way of establishing the level of IS funding relative to the other funding needs of the command. This issue puts both IS and general managers at a disadvantage.

11 Issue: Measuring IS effectiveness and productivity

Rationale: Measuring IS performance is crucial to managing it. Assessing performance is becoming critical as commands invest more in information systems.

DON
RANK

12 Issue: *Establishing standardized hardware, software, and systems

Rationale: Functional standardization of hardware and software products will increase end user productivity by reducing individual acceptance and training time, and save money by reducing multiple and incompatible systems.

13 Issue: *Improving the understanding of end user requirements

Rationale: A major problem in the systems development process is implementing systems that fail to deliver what the end users needed.

14 Issue: Promoting the learning and use of IS technologies

Rationale: The commands that will prosper are those that can integrate new IS technologies into their overall operation.

15 Issue: *Establishing a career path for IS trained officers

Rationale: Officers trained in IS are not utilized effectively. For example, many are assigned to at most one tour in an IS billet or rotated from an IS billet to a non IS billet.

16 Issue: Planning and implementing a telecommunication system

Rationale: Communication is the lifeblood of the command, but rapid and major changes in this industry make this task very difficult.

17 Issue: Reducing the high turnover of IS personnel with critical skills

Rationale: High turnover rates of skilled IS people due to transfers, temporary duty, separations, and other reasons create project cancellations, backlogs, and other discontinuities in an IS activity.

DON
RANK

18 Issue: *Adopting improved project development and management capabilities

Rationale: Project development and management can be enhanced by incorporating modern systems development methodologies and tools, and/or project management techniques and tools.

19t Issue: Managing data and document storage

Rationale: There is a need now to provide for large data and document storage requirements. These requirements will be even greater in the future.

19t Issue: Planning, implementing, and managing office automation

Rationale: Office automation is being implemented to improve "white collar" productivity. Determining how this should be done and what role an IS activity should play is a problem.

21 Issue: Planning and managing of the applications portfolio

Rationale: The applications portfolio is growing in size, complexity, and resulting maintenance costs. Despite the longevity of the maintenance problem, very little is known about managing it effectively.

22 Issue: *Training IS officers periodically

Rationale: IS officers need refresher courses and/or specialized training especially when they return to an IS billet after serving in a non IS billet.

23 Issue: Developing and implementing decision support systems

Rationale: Improving the effectiveness of managers is a critical objective for IS. There has been much promise but little success in this area.

DON
RANK

24 Issue: Specifying, recruiting, and developing human resources for IS

Rationale: Present and future shortages of qualified IS personnel threaten an IS activity's ability to keep up with the information needs of its user commands.

25 Issue: Making effective use of computer graphics

Rationale: Graphics offers an effective way to present information, but problems need to be resolved in using them interactively and remotely, and integrating them with available reporting mechanisms.

26 Issue: Managing the impact of artificial intelligence

Rationale: AI may prove to be a major force transforming information systems and its parent command, but very little is known about managing this increasingly feasible technology.

* New Issue

APPENDIX F: ROUND TWO COMPARISON WITH BRANCHEAU AND WETHERBE (1987) STUDY

TABLE F.1.1
COMBINED DON COMPARISON OF TOP TEN CRITICAL ISSUES

DON RD 2 RANK	DON RD 1 RANK	B&W RD 3 RANK	B&W RD 2 RANK	B&W RD 1 RANK	CRITICAL ISSUES
1	1	1	1	1	Improving IS strategic planning
2	3	10	9	7	Integrating data processing, office automation, and telecommunication
3	2	18	19	14	Improving information security and control
4	6	7	6	5	Making effective use of data as an organizational resource
5t	8	5	5	4	Aligning an IS activity with the objectives of the entire command
5t	9	13	12t	10	Improving the quality of software development
7	4	6	8	6	Facilitating and managing end user computing
8	5	4	2	2	Increasing understanding of the role and contribution of IS
9	19	NA	NA	NA	*Establishing a streamlined, more efficient procurement process
10	7	20	16t	13	Determining IS funding levels

D: Dropped in Round 3 Questionnaire
t: Tied with another issue
*: New issue
NA: Not Analyzed in B&W Study

TABLE F.1.2
COMBINED DON COMPARISON OF ADDITIONAL CRITICAL ISSUES

DON RD 2 RANK	DON RD 1 RANK	B&W RD 3 RANK	B&W RD 2 RANK	B&W RD 1 RANK	CRITICAL ISSUES
11	12	9	11	8	Measuring IS effectiveness and productivity
12	22	NA	NA	NA	*Establishing standardized hardware, software, and systems
13	21	NA	NA	NA	*Improving the understanding of end user requirements
14	11	3	3	3	Promoting the learning and use of IS technologies
15	23	NA	NA	NA	*Establishing a career path for IS trained officers
16	10	11	10	9	Planning and implementing a telecommunication system
17	13	NA	NA	NA	Reducing the high turnover of IS personnel with critical skills
18	24	NA	NA	NA	*Adopting improved project development and management capabilities
19t	17	D	23t	18	Managing data and document storage
19t	14	D	20t	16	Planning, implementing, and managing office automation
21	16	16	14t	12	Planning and managing of the applications portfolio
22	25	NA	NA	NA	*Training IS officers periodically
23	18	D	23t	17	Developing and implementing decision support systems
24	15	12	12t	11	Specifying, recruiting, and developing human resources for IS
25	20	D	25t	19	Making effective use of computer graphics
26	26	15	20t	15	Managing the impact of artificial intelligence

D: Dropped in Round 3 Questionnaire

TABLE F.2.1
U.S. NAVY COMPARISON OF TOP TEN CRITICAL ISSUES

USN RD 2 RANK	USN RD 1 RANK	B&W RD 3 RANK	B&W RD 2 RANK	B&W RD 1 RANK	CRITICAL ISSUES
1	3	1	1	1	Improving IS strategic planning
2	2	10	9	7	Integrating data processing, office automation, and telecommunication
3	1	18	19	14	Improving information security and control
4	6	7	6	5	Making effective use of data as an organizational resource
5	5	4	2	2	Increasing understanding of the role and contribution of IS
6	9	5	5	4	Aligning an IS activity with the objectives of the entire command
7	4	6	8	6	Facilitating and managing end user computing
8	11	13	12t	10	Improving the quality of software development
9	19t	NA	NA	NA	*Establishing a streamlined, more efficient procurement process
10	8	20	16t	13	Determining IS funding levels

D: Dropped in Round 3 Questionnaire
t: Tied with another issue
*: New issue
NA: Not Analyzed in B&W Study

TABLE F.2.2
U.S. NAVY COMPARISON OF ADDITIOONAL CRITICAL ISSUES

USN RD 2 RANK	USN RD 1 RANK	B&W RD 3 RANK	B&W RD 2 RANK	B&W RD 1 RANK	CRITICAL ISSUES
11	14	9	11	8	Measuring IS effectiveness and productivity
12	10	3	3	3	Promoting the learning and use of IS technologies
13	23	NA	NA	NA	* Improving the understanding of end user requirements
14	21	NA	NA	NA	*Establishing a career path for IS trained officers
15	22	NA	NA	NA	*Establishing standardized hardware, software, and systems
16	7	11	10	9	Planning and implementing a telecommunication system
17	15	NA	NA	NA	Reducing the high turnover of IS personnel with critical skills
18	25	NA	NA	NA	*Adopting improved project development and management capabilities
19	12	D	20t	16	Planning, implementing, and managing office automation
20	17	D	23t	18	Managing data and document storage
21	26	NA	NA	NA	*Training IS officers periodically
22	16	NA	NA	NA	Planning and managing of the appl ations portfolio
23	13	12	12t	11	Specifying, recruiting, and developing human resources for IS
24	18	D	23t	17	Developing and implementing decision support systems
25	19t	D	25t	19	Making effective use of computer graphics
26	24	15	20t	15	Managing the impact of artificial intelligence

D: Dropped in Round 3 Questionnaire

TABLE F.3.1
U.S. MARINE CORPS COMPARISON OF TOP TEN CRITICAL ISSUES

USMC RD 2 RANK	USMC RD 1 RANK	B&W RD 3 RANK	B&W RD 2 RANK	B&W RD 1 RANK	CRITICAL ISSUES
1	1	1	1	1	Improving IS strategic planning
2	2	13	12t	10	Improving the quality of software development
3	7t	7	6	5	Making effective use of data as an organizational resource
4	3	3	3	6	Facilitating and managing end user computing
5	4	5	5	4	Aligning an IS activity with the objectives of the entire command
6	5	10	9	7	Integrating data processing, office automation and telecommunication
7	10	18	19	14	Improving information security and control
8	20	NA	NA	NA	*Establishing standardized hardware, software, and systems
9	6	4	2	2	Increasing understanding of the role and contribution of IS
10	9	9	11	8	Measuring IS effectiveness and productivity

D: Dropped in Round 3 Questionnaire
t: Tied with another issue
*: New issue
NA: Not Analyzed in B&W Study

TABLE F.3.2
U.S. MARINE CORPS COMPARISON OF ADDITIONAL CRITICAL ISSUES

USMC RD 2 RANK	USMC RD 1 RANK	B&W RD 3 RANK	B&W RD 2 RANK	B&W RD 1 RANK	CRITICAL ISSUES
11	18	NA	NA	NA	*Improving the understanding of end user requirements
12	7t	20	16t	13	Determining IS funding levels
13t	11	NA	NA	NA	Reducing the high turnover of IS personnel with critical skills
13t	20	NA	NA	NA	*Establishing standardized hardware, software, and systems
15	12	3	3	3	Promoting the learning and use of IS technologies
16	22	NA	NA	NA	*Adopting improved project development and management capabilities
17	14	16	14t	12	Planning and managing of the applications portfolio
18t	13t	11	10	9	Planning and implementing a telecommunication system
18t	19	D	23t	17	Developing and implementing decision support systems
20	15	D	23t	18	Managing data and document storage
21	16	12	12t	11	Specifying, recruiting, and developing human resources for IS
22	17	D	20t	16	Planning, implementing, and managing office automation
23	25t	NA	NA	NA	*Establishing a career path for IS trained officers
24	24	NA	NA	NA	*Training IS officers periodically
25t	23	D	25t	19	Making effective use of computer graphics
25t	25t	15	20t	15	Managing the impact of artificial intelligence

D: Dropped in Round 3 Questionnaire

TABLE G.1.1: DON TOP TEN CRITICAL ISSUES COMPARED WITH PREVIOUS STUDIES

	1991 DON RD 2 RANK	1991 DON RD 1 RANK	1991 USN RD 2 RANK	1991 USN RD 1 RANK	1991 USMC RD 2 RANK	1991 USMC RD 1 RANK	1990 MRSP RANK	1987 B&W RD 3 RANK	1987 B&W RD 2 RANK	1987 B&W RD 1 RANK	1986 H&H RANK	1984 DLNW RD 4 RANK	1984 DLNW RD 3 RANK	1984 DLNW RD 2 RANK	1984 DLNW RD 1 RANK	1982 B&H RANK
Improving IS stratgeic planning	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1
Integrating data processing, office automation, and telecommunication	2	3	2	2	6	5	6	10	9	7	7	3	3	3	8	3
Improving information security and control	3	2	3	1	7	10	NA	18	19	14	6	13	13	13	10t	14
Making effective use of data as an organizational resource	4	6	4	6	3	7t	NA	7	6	5	4	9	8t	9	16	9
Aligning an IS activity with the objectives of the entire command	5t	8	6	9	5	4	NA	5	5	4	2	7	7	7	7	7
Improving the quality of software development	5t	9	8	11	2	2	4	13	12t	10	3	4	4	4	6	4
Facilitating and managing end user computing	7	4	7	4	4	3	7	6	8	6	5	2	2	2	2	2
Increasing understanding of the role and contribution of IS	8	5	5	5	8t	6	NA	4	2	2	8	14t	14	15	12t	15
*Establishing a streamlined more efficient procurement process	9	19	9	19t	13t	21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Determining IS funding levels	10	7	10	8	12	7t	1	20	16t	13	NA	16	16	16	14t	16

MRSP: Marine Corps Mid-Range Information Systems Plan
B & W: Brancheau and Wetherbe
H & H: Hartog and Herbert
DLNW: Dickson, Leithesier, Nechis, and Wetherbe
B & H: Ball and Harris

D: Dropped in Round 3 Questionnaire
t: Tied with another issue
*: New issue
NA: Not Analyzed in this study or Not Available

TABLE G.1.2: DON ADDITIONAL CRITICAL ISSUES COMPARED WITH PREVIOUS STUDIES

	1991 DON RD 2 RANK	1991 DON RD 1 RANK	1991 USN RD 2 RANK	1991 USN RD 1 RANK	1991 USMC RD 2 RANK	1991 USMC RD 1 RANK	1990 MRSP RANK	1987 B&W RD 3 RANK	1987 B&W RD 2 RANK	1987 B&W RD 1 RANK	1986 H&H RANK	1984 DLNW RD 4 RANK	1984 DLNW RD 3 RANK	1984 DLNW RD 2 RANK	1984 DLNW RD 1 RANK	1982 B&H RANK
Measuring IS effectiveness and productivity	11	12	11	14	10	9	NA	9	11	8	14	5	5	5	4	5
*Establishing standardized hardware, software, and systems	12	22	15	22	8t	20	4	NA	NA	NA	NA	NA	NA	NA	NA	NA
*Improving the understanding of end user requirements	13	21	13	23	11	18	5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Promoting the learning and use of IS technologies	14	11	12	10	15	12	6	3	3	3	NA	6	6	6	3	6
*Establishing a career path for IS trained officers	15	23	14	21	23	25t	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Planning and implementing a telecommunication system	16	10	16	7	18t	13t	9	11	10	9	10	13	12	14	9	13
Reducing the high turnover of IS personnel with critical skills	17	13	17	15	13t	11	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
*Adopting improved project development and management capabilities	18	24	18	25	16	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Managing data and document storage	19t	17	20	17	20	15	NA	D	23t	18	NA	18t	19	18	18t	19
Planning, implementing, and managing office automation	19t	14	19	12	22	17	NA	D	20t	16	11	12	12	12	10	12
Planning and managing of the applications portfolio	21	16	22	16	17	14	NA	16	14t	12	NA	10t	11	11	14	11
*Training IS officers periodically	22	25	21	26	24	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Developing and implementing decision support systems	23	18	24	18	18t	19	NA	D	25t	19	19	10	10	10	12	10
Specifying, recruiting, and developing human resources for IS	24	15	23	13	21	16	8	12	12t	11	15	8	8	8	4t	8
Making effective use of computer graphics	25	20	25	19t	25t	23	NA	D	25t	19	NA	17	17	17	18	17
Managing the impact of artificial intelligence	26	26	26	24	25t	25t	NA	15	20t	15	21	18	18	19	17	18

MRSP: Marine Corps Mid-Range Information Systems Plan
B & W: Brancheau and Wetherbe
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